ELECTRICAL REVIEW

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Load Factor Improvement

HALF a century or more ago the electricity supply industry came to appreciate that it was severely handicapped commercially because it could not store its product, so that load factor took on a very special significance. Except that the load factor of the national supply system is much higher to-day, the basic problem is still with us, a point which was brought out forcibly throughout all the papers presented at the British Electrical Power Convention at Eastbourne last week, particularly the paper by Mr. Dennis Bellamy, chairman, Yorkshire Electricity Board.

A similar note, sometimes apparently unintentional, or without direct reference, in other papers reflected the importance of the subject, and we were made to realize more forcibly than ever that every aspect of not only electricity supply development, but of electrical trade development as a whole, including overseas trade, has its roots in the load factor problem.

With such extreme importance then, why is it that more has not been done to improve matters in this direction? Firstly, we should say, there have been wrong selling methods, or failure to appreciate that the load factor problem has demanded special selling methods. At one time when it became evident that more electricity had to be sold if fuller advantage was to be taken of the establishment of the national grid, intense direct electricity selling became the order of the day. This soon opened out to all sorts of schemes throughout the country designed to create diversity of demand which is the very foundation of load factor improvement, and all these schemes became embraced in a wider conception of electricity selling which became known as "load building." This conception was largely destroyed by wartime and post-war restrictions, and particularly by load shedding. But the trend was to consider domestic load diversity exclusively, rather than overall diversity.

Then there have been great fears about what would happen to the peaks if certain desirable loads were pushed too far. For instance, many supply engineers have shown apprehension about their networks in connection with space heating, but this had already been overcome in London in connection with the commercial (office) load and in Sheffield in connection with the industrial load.

Immediately before the last war great headway was made in creating a type of space heating load (low temperature) which did much to reduce the installation peaks and to create its own diversity by means of automatic control. Now, we hear next to nothing about it, while high-temperature heating is regarded as an intermittent load.

Very great improvement of load factor could be brought about by greatly extended shift work in the factories, of course, but that involves political problems which demand a much greater degree of co-operation than has been manifest so far in peacetime.

OPTIMUM LOAD

Everybody knows that the main hope of reducing the price of electricity lies in the better use of the generating plant. But not all are aware that there is a fairly low level to which it is desirable to limit load factor. Sir Vincent de Ferranti raised this point at the " Electrical Forum " at Eastbourne last Friday when he asked what the optimum figure was, in view of the necessity for taking out plant for overhaul. Some of the audience may have been surprised when Sir John Hacking said that in South Wales a load factor of 60 per cent had raised some difficulty and that this seemed to be a possible general maximum. Sir Charles Westlake said that in Uganda they hoped for a load factor of 80 per cent but there no question of electric heating was involved. Lord Citrine, mentioning that the present load factor of the B.E.A. system was 48 per cent, made a point when he calculated that the general load factor of industrial establishments could not be much more than 30 per cent, in the absence of shift operation.

WASTED EFFORT

Good intentions lie behind the Monopolies and Restrictive Practices Act but it is notorious that good intentions form the slippery surface of an ill-directed pathway. Ostensibly to find a way to protect the public against exploitation, the principals of trade associations and individual industrial concerns are being required to give much valuable time to the inquiries of the Monopolies Commission. It is quite clear that this is shocking waste when industrial leaders should be devoting all their attention to production, particularly for export. It cannot be wondered at that Sir John Dalton at Eastbourne described the Commission's activities as a " dead loss." This pronouncement by the leader of a cable-making company may not be regarded as entirely disinterested, but Lord Citrine's views as a " customer " are certainly unbiased. He did not favour unrestricted competition, for among other things it was likely to drive down the standards of the workers. He preferred to rely on the fair dealing of the associations with which the B.E.A. had relations, although he did consider that the associations should give reasonable assurances regarding their costs.

RURAL SUPPLIES

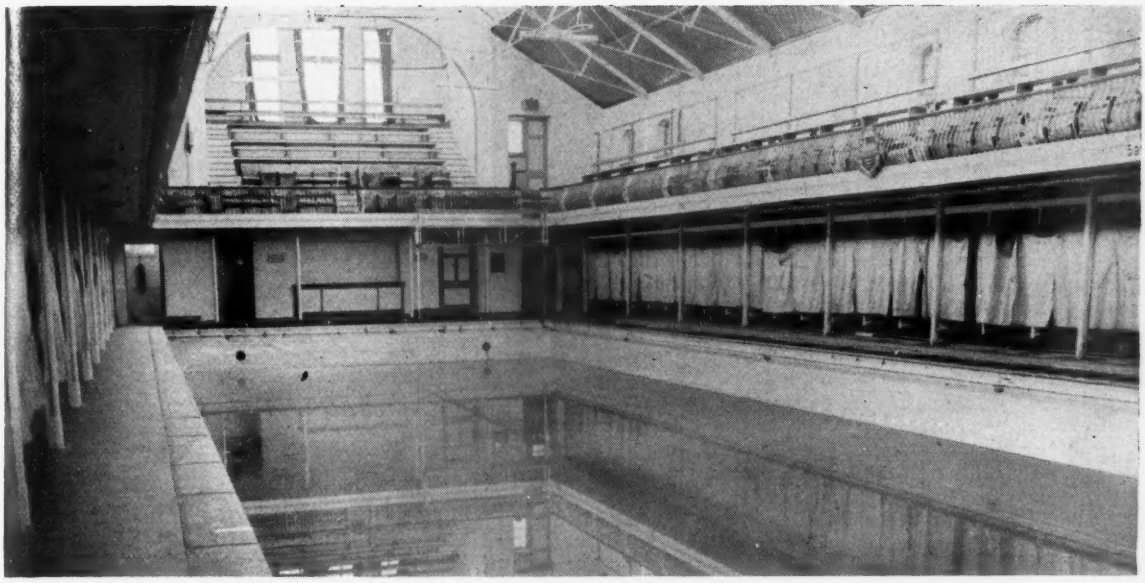
In order to speed up rural electrification the Government of Northern Ireland in 1948 decided that supplies should be provided without a guaranteed minimum revenue return or contribution towards the cost of the extensions being required from consumers. At the same time the Electricity Board was enjoined to proceed with rural development to the maximum extent that the availability of materials and labour would permit. It became clear, however, that without a sufficient return on the large capital outlay involved, the Board's financial position would be seriously impaired. This condition was aggravated by a recession in the textile industry and consequently rural extensions had to be limited for the most part to those giving an economic return, apart from supp es in the national interest. This, of course, was he reverse of the Government's original intention. I st year an amending Act was passed restoring the Boa l's powers to ask for a guaranteed revenue or a contri u-tion towards the cost of supply. The 1953 repor of the Board, just published, shows that more fa ns were connected than in the preceding twelve mo hs (1,448 against 1,328) and there was a " gratify ng response " from applicants in accepting the terms or supply. Good progress was made generally, sale of electricity increasing by 10.9 per cent compared with 3.8 per cent in 1952.

SIR CHARLES PARSONS

Claims to have originated this or the other mechanical device have been innumerable in history, but the essential credit must be given to those who have first put usually sketchy ideas into a form that can be of material advantage to the public. Parsons was not, of course, the " inventor " of the steam turbine, any more than James Watt was the " inventor " of the reciprocating steam engine, but the results of their work were epoch-making in the true sense. In his address (reported in this issue) at the opening of the Parsons Centenary Exhibition last week, Professor Aubrey Burstall showed how much of the success of Parsons was due to an ability to apply a thorough knowledge of scientific and engineering principles coupled with a skill in craftsmanship that gave him a remarkable insight into practical requirements and a character that was undaunted by difficulties. As a king-pin, there was the possession of an apparent intuition, mysterious to his colleagues, that enabled him to reach sound conclusions by super-normal mental processes. Nevertheless it seems more than likely that Edison's definition of genius as 1 per cent inspiration and 99 per cent perspiration held good in Parsons' case.

ROUND- AND FLAT-PIN PLUGS

During recent weeks in some quarters there has been a tendency to revive the old controversy of round-*versus* flat-pin plugs for domestic type outlets, and background pictures have again been drawn of bewildered householders faced with a confusing variety of plug sizes and shapes. Are these pictures really representative of the true position? It was about twenty years ago that this controversy was at its height and it then seemed that the main complaint came from the then new flat-pin camp on the grounds that there was a British Standard Specification in existence only for the round-pin plug and this favoured the round pin at the expense of the flat. It was asserted that there was room for two specifications—one for round and one for flat pins—and that with the arrival of a flat-pin specification the controversy would end. Well, now we have both specifications, but considerable efforts are obviously still being made to keep the dispute alive. We are not so sure, however, that the average user is very much bewildered about it all.



Modernized Swimming Baths

Electrode Boiler Installation at Weston-super-Mare

THE recent conversion of the Weston-super-Mare Corporation's Knightstone swimming and slipper baths from solid fuel to electrode boiler heating has not only reduced operating costs and simplified working conditions but has also freed about 5,000 sq ft of space for use as gardens and an extension of the promenade footpath.

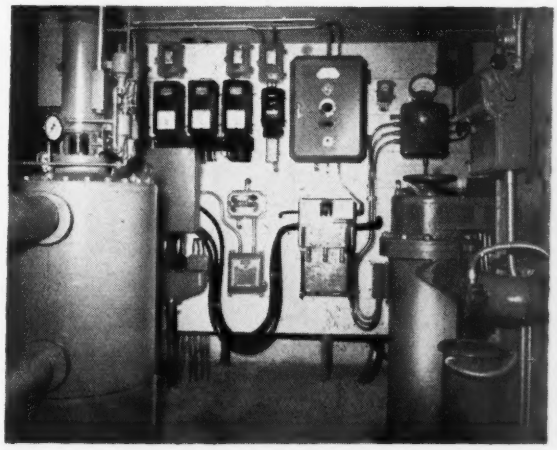
Apart from both large and small swimming baths the installation covers slipper and medicinal baths and a laundry. Before the change-over to electricity, a 5,000 lb/hr Lancashire boiler was used in the winter and a Cochrane 4,000 lb/hr unit in the summer to heat the water in both swimming baths, to provide space heating and hot water (fresh and sea) for the slipper and medicinal baths, and to supply steam for the laundry. In addition, in the winter 720 lb/hr of steam was required to drive a scraper winch for removing silt from the marine lake. This last-mentioned service is now performed by a 30 h.p. motorized unit, it being uneconomical to substitute an electrode boiler, which would require to have a loading of 250 kW to produce the required quantity of steam due to the inefficiency of the steam engine.

To warm the water in the two swimming baths, which measure 100ft by 33ft and 60ft by 30ft and contain 120,000 gal and 45,000 gal of water respectively, a 200 kW electrode hot water boiler is now employed in conjunction with a calorifier. Water from the baths is pumped at a rate of 25,000 gal/hr through the secondary side of the calorifier which is heated by low pressure hot water from the boiler. A Cambridge regulator reduces the boiler load to zero when the desired temperature is reached. In addition there is Venner time switch control provided by the South Western Electricity Board to ensure off-peak operation only. The Corporation has installed an additional time switch to enable the baths superintendent to operate the plant independently of the Cambridge regulator.

A filtration system was already installed with a 7½ h.p. pump for circulating the water. The pipework has therefore been modified and additional valves installed so that, while this existing filter pump continues to operate in the daytime, a new Worthington Simpson pump of similar capacity associated with the new boiler plant comes into service at night. Either pump can be used as stand-by for the other, but the filtration plant is by-passed during the night.

Space heating in both baths is provided by means of a 60 kW water boiler. An accelerator pump carries the low pressure hot water through pipes below the gallery in the large bath and below the roof in the small bath.

On the left is a 200 kW electrode boiler which heats the pool water in the swimming baths. On the right is a 60 kW boiler for space heating. The control panel, oil circuit breaker and switchgear are seen in the background

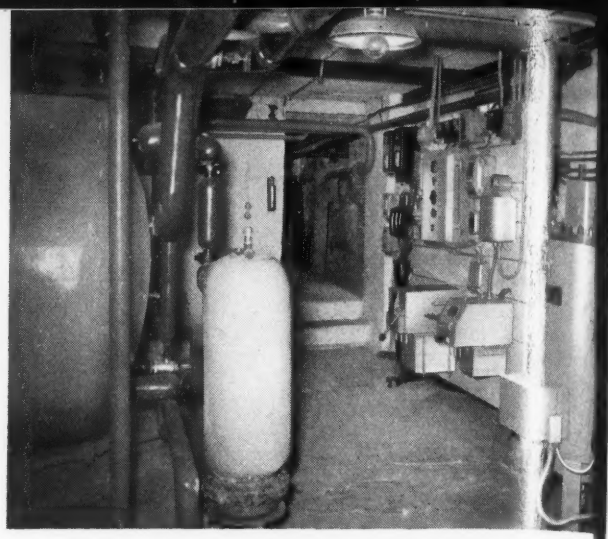


This boiler is equipped with a new time switch confining operation to off-peak hours when a special electricity tariff applies.

A recess previously used solely as a chemical stores now also accommodates both the water heating and space heating boilers used in the swimming baths, as well as the control panel comprising the Statter main switch, Venner time switches, "Memrex" switch fuses, British Klockner motor starters and an Arrow Hart contactor for making and breaking the central heating boiler circuit under thermostatic control.

The building used for the slipper and medicinal baths was erected at the beginning of the last century. Here an old basement kitchen has been brought into service to accommodate the heating plant which comprises a 150 kW steam boiler feeding two small non-storage (steam to water) calorifiers which in turn supply two 1,200 gal storage vessels for fresh and sea water. The hot water circulates between the secondary side of the calorifiers and storage vessels at night and when the desired storage temperature is reached the steam inlets to the calorifiers are closed by thermostatically controlled valves. Space heating in this building is provided by a separate 30 kW hot water boiler with a small accelerator pump to circulate the water round the radiators. The control panel for these two boilers is very similar to that used for the swimming baths.

The equipment of the laundry comprises three washing machines and two hydro-extractors (Manlove Alliott), an Isaac Braithwaite tumbler dryer, a Summerscales 108in by 24in dia calender, a starch boiler and a still for supplying most of the distilled water requirements of the town. For this installation there is a 350 kW steam boiler with time-switch control, providing both steam and hot water, the latter through a non-storage calorifier and a 250 gal storage tank. In this case the boiler house has been built over the old pump house on a concrete platform.



To provide steam for heating the fresh water and sea water for the slipper baths this 150 kW electrode boiler is used. In the background are the control panel and main switchgear and on the left are the water storage vessels and one of the non-storage calorifiers

The modernization of the baths has also involved the changing-over of all the motors from d.c. to a.c., in the course of which pipework has been modified to enable a single Beardmore pump with a 25 h.p. Brook motor to replace two 25 h.p. and 7½ h.p. pumps used for pumping sea water into the settling tank or from the settling tank to the baths.

The kWh consumption from February to October of the various boilers is given in the table, showing that the total consumption is within the original estimated figure of 800,000 kWh per annum. Previously operation with the solid fuel fired boilers cost about £2,800 a year, including the extra labour involved and maintenance.

The whole of the water heating plant was supplied and installed by Bastian & Allen, Ltd.

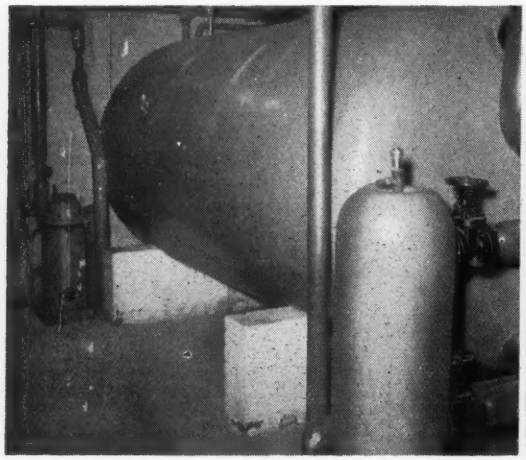
We are indebted to the chairman of the Weston-super-Mare Corporation's Public Buildings and Baths Committee, Councillor Gordon Couch, and to Mr. J. R. Freer-Hewish, A.M.I.C.E., M.I.Mun.E., A.W.I.W.E., borough engineer, for permission to publish these details. The baths superintendent is Mr. J. A. King, M.N.A.B.S., S.T.A.

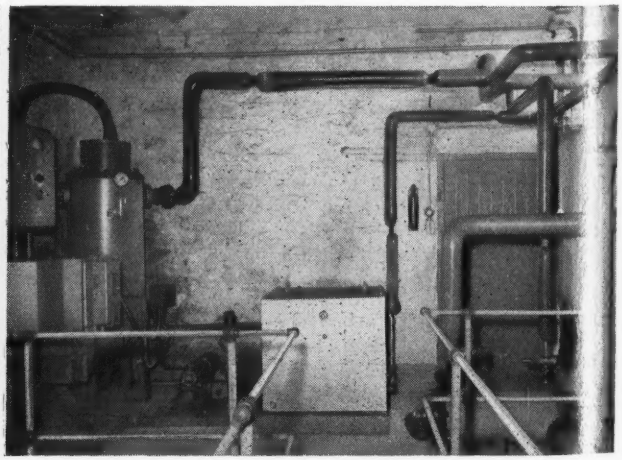
KNIGHTSTONE BATHS, WESTON-SUPER-MARE:
Electricity Consumption, February to October, 1953

Boiler	Load	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.
	kW	kWh	kWh	kWh	kWh	kWh	kWh	kWh	kWh	kWh
Pool heating	200	29,000	27,170	42,930	25,880	17,290	11,160	7,500	16,180	16,890
Laundry	350	23,430	15,670	18,610	22,810	26,860	28,160	24,540	23,420	8,520
Pool space heating	60	2,151	10,610	4,100	—	—	—	—	—	596
Slipper baths	150	17,500	18,090	18,550	18,780	18,080	20,770	19,640	18,990	17,670
Medicinal bath space heating	30	4,960	3,950	1,620	—	—	—	—	—	—
All boilers	790	77,041	75,490	85,810	67,470	62,230	60,090	51,680	58,590	43,676

Nine Months' Total — 582,077 kWh; Average Year — 777,112 kWh

Left: A 30 kW boiler provides space heating in the slipper and medicinal baths. On the right is the sea water storage vessel and in the foreground the non-storage calorifier. Right: This 300 kW electrode steam boiler seen with control panel, main oil circuit breaker, boiler feed pump and feed tank, supplies all steam for the laundry. Hot water is provided through a small non-storage calorifier and storage cylinder shown on the right





Electric Cables

Possibilities and Limitations in the Transmission of Electricity

By C. C. BARNES, A.M.I.E.E., A.I.I.A.*

THE last two decades have seen rapid advances throughout the world in the voltage levels used for the bulk transmission of power—Fig. 1 shows the increase during the past sixty years.[1] In recent years the continued high prices for copper, lead and steel have resulted in a greater use of gas-pressure and oil-filled cables for 33 kV and higher voltages in view of the high dielectric stress and current rating permitted with these special designs.

An approximate indication of oil-filled cable installations in this country in feeder miles was recently given by A. L. Ashton[2] as follows:—132 kV, 96; 66 kV, 260; 33 kV, 200; total 556. The approximate mileage of cable installed abroad is given as 1,094 miles so that the total mileage of this design of cable is well in excess of 1,600 miles. All the totals quoted refer to three-phase circuit miles of cable installed and not core mileage of cable manufactured. The totals relating to the impregnated gas-pressure cable given in Table 1 were recently published.[3]

The equivalent total three-phase mileage of impregnated pressure cable detailed in Table 1 is 210 miles—the total three-phase mileage of all types of gas cables installed and under construction in this country is over 250 miles.

Insulated Cables *v.* Overhead Lines

The major factor against a greater use of insulated cable is the high price of this equipment, and of the associated excavation and reinstatement charges. Table 2 gives an approximate comparison between cable and overhead line prices for various loads and voltages.

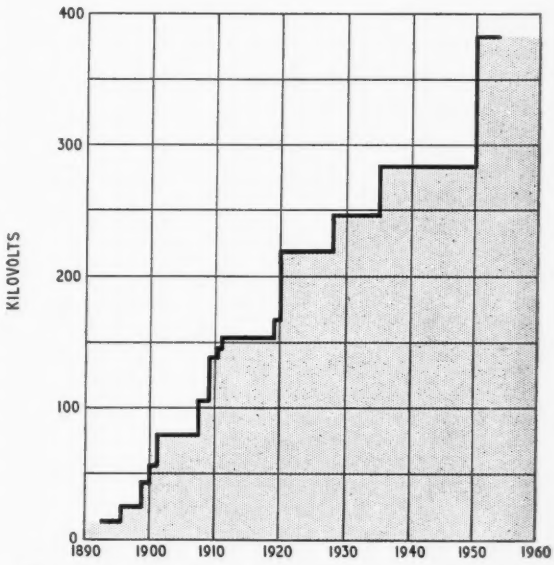


Fig. 1.—Maximum transmission voltages in use or about to be used

Cable economy can be effected either by reducing the selling[4] price and/or increasing the permissible current rating. Both possibilities offer ample scope for detailed investigation. Despite the price disadvantage of electric cables considerable use has to be made of them in this country. In the British Electricity Authority's Fifth Report it is stated that the Authority's main transmission system at 31st March, 1953, comprised 4,682 route miles (6,471 circuit miles) of overhead lines and underground cables as in Table 3.

It will be noted that considerable use has been made of cable for 66 kV routes.

Aluminium-Sheathed Cables

Lead, after more than half a century as the principal cable sheathing material, at last faces a serious competitor—aluminium. To date British manufacturers have made

TABLE 1

APPROXIMATE LENGTHS OF IMPREGNATED PRESSURE GAS-FILLED) CABLE

	System voltage				Total (all volt-ages)	Total (single- and three-core)
	33 kV	66 kV	132 kV	Others		
	yard	yards	yards	yards	yards	yards
Installed to date						
Single-core ...	3,348	3,009	12,411	2,800	21,568	274,653
Three-core ...	103,594	129,816	19,540	135	253,085	
To be or being installed						
Single-core ...	—	1,200	—	—	1,200	111,425
Three-core ...	5,425	74,000	20,940	9,860	110,225	
Total (all contracts)						
Single-core ...	3,348	4,209	12,411	2,800	22,768	386,078
Three-core ...	109,019	203,816	40,480	9,995	363,310	

TABLE 2

OVERHEAD LINES AND INSULATED CABLES: APPROXIMATE PRICE COMPARISON

Load MVA	Service voltage kV	Approx. conductor size		Approx. cost per mile		Price ratio (ins. cable/ overhead line)
		Insulated cable	Overhead line†	Insulated cable	Overhead line†	
		Sq in	Sq in copper equivalent	£	£	
200	275	2 × 0·40	Twin 0·175	305,000	16,000	19: 1
100	132	1 × 0·30	0·175	60,000	9,000	6·7 : 1
40	66	1 × 0·20	0·15	36,000	6,500	5·5: 1
20	33	1 × 0·20 oil-filled	0·10	25,000	5,500	4·5 : 1

† Steel tower construction throughout; prices include terminations. Overhead line and insulated cable prices include for double circuit supply in each case. Normal site conditions assumed throughout. Metal basis copper £245/ton and lead £95 10s/ton including delivery charges.

TABLE 3

ROUTE MILEAGE OF OVERHEAD LINES AND UNDERGROUND CABLES ON THE B.E.A.'s MAIN TRANSMISSION SYSTEM (31st MARCH, 1953)

	132 kV route miles	66 kV or lower voltages route miles	Total route miles
Overhead lines	4,107	140	4,247
Underground cables ...	67	368	435
Totals	4,174	508	4,682
Percentage of cable ...	1·6	72·7	9·3

* Cable engineer, British Electricity Authority headquarters staff.

about 3,500 miles of aluminium-sheathed cable and, according to Wyatt,[5] the Germans perhaps 500 miles, while in North America there are more than 100 miles. The major portion of this production is made by a swaging technique in which the insulated cores are threaded into pre-extruded seamless aluminium tube which is then subjected to a sinking or swaging process to form an accurately fitting sheath.

The hot extrusion of aluminium sheathing directly on to the insulated conductor(s) has for many years been the subject of a good deal of experimental work by German engineers,[6] but the high extrusion temperature (in excess of 500 deg C) affected both the steel of the press and the cable insulation.

Several aluminium extrusion presses employing different principles are now being developed and it is hoped that in due course a reliable extrusion technique with commercial grades of aluminium will be possible.

The use of aluminium-sheathed cables has emphasized strongly the need for providing and adequately testing special anti-corrosion forms of sheath protection[7] since aluminium is particularly susceptible to corrosion in alluvial soils and further, owing to its position in the electro-chemical series, the danger of corrosion due to contact with dissimilar metals is considerable. A useful review[8] of this problem has recently been published.

275 kV and Higher Voltage Cables

Arising out of extensive manufacturing and service experience with 132 kV cables, British cable makers have developed five cable systems for 275 kV service as follows:—low-pressure oil-filled; high-pressure gas-filled (pre-impregnated dielectric); compression (external gas-pressure); impregnated pressure (mass-impregnated, gas-filled); and gas-cushion (mass-impregnated, gas-filled). The last two systems differ only in detail.

Design particulars for the various constructions referred to are not yet final, but the following data relating to the I.P. cable[9] system will give an indication of the dimensions of a 275 kV 0·75 sq in single-core paper-insulated lead-sheathed metal reinforced cable, protected overall with a rubber-bitumen sandwich serving:—

Nominal pneumatic pressure	200 lb/sq in
Maximum electric stress at the conductor	110 kV/cm
Radial thickness of dielectric	1·005in
Radial thickness of lead sheath	0·12in
Approximate diameter over conductor	1·119in
Approximate diameter over screened dielectric	3·14in
Approximate diameter over lead sheath	3·48in
Approximate diameter over reinforcement	3·57in
Approximate overall diameter	3·99in
Maximum continuous rating laid direct in the ground	530 A
Corresponding three-phase load	250 MVA (approx.)

Fig. 2 shows a telescoped section of the above cable.

The conductor consists of 91/·103in tinned copper wires which are tied down and screened with metallized paper tapes to make the conductor more nearly cylindrical and thereby reduce the electrical stress concentration. The application of the paper insulation requires the lapping of about 230 tapes of high quality paper. A copper woven fabric tape is applied over the dielectric screen to protect it and to ensure positive contact with the lead sheath.

After impregnation a lead sheath (containing a small percentage of tin) is then extruded on to the cable which is then wrapped with narrow metallic tapes having a very long lay to provide longitudinal reinforcement, then a further layer of wider tapes applied with a short lay to give circumferential strength.

For single-core cables a 1 per cent tin-bronze reinforcement is used because of its high tensile strength and relatively high electrical resistance which minimizes the induced losses. Finally the cable is protected with a rubber-bitumen serving consisting of layers of rubber and compounded fabric tapes which, together with the application of a bitumen type compound, provide protection against corrosion.

A 0·4 sq in (66/·090in) single-core oil-filled 300 kV cable having 0·95in radial thickness of insulation has recently been made and tested in this country and a pioneer 380 kV Swedish oil-filled cable installation[10] for transmitting 360 MVA has been commissioned at Harspranget power station (north of the Arctic Circle). A 380 kV oil-filled cable of French manufacture has also been installed at Harspranget.

High-Voltage D.C. Transmission by Power Cables

Possible future demands for the transmission of large blocks of power over distances of several hundred miles are tending to make conditions favourable for high-voltage d.c. schemes. There is general agreement that d.c. systems use less material than those for a.c. and it is usual to point out the advantages of d.c. for transmitting amounts of power of the order of 500 MW over distances of about 500 kM.

According to Erroll and Forrester,[11] a typical d.c. cable circuit to transmit 360 MW would comprise two single-core cables of 2·5 to 3in overall diameter and weighing an average of 30 lb/yd. The length of route would vary from 50 to 100 miles and the track might be on the sea floor, over or through a range of mountains or across a sparsely populated country of scrub or jungle. Table 4 reproduced from Erroll and Forrester's paper contains cable sizes for various loads and indicates the magnitude of the losses.

The maximum electric design stress adopted in this country for oil-filled and gas-pressure cables used on a.c. circuits is of the order of 85 to 110 kV/cm and this design stress can be increased about three times for d.c. operation.

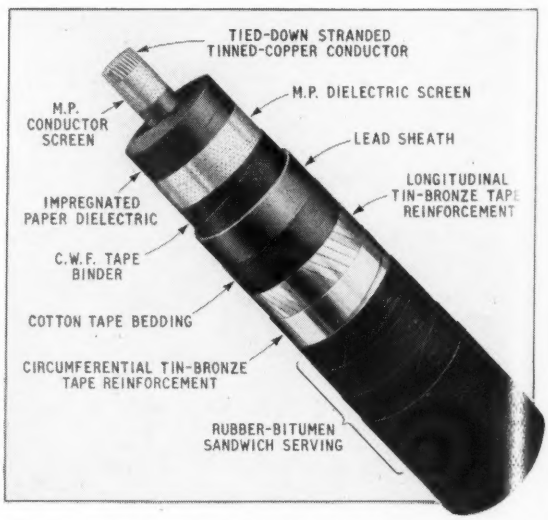


Fig. 2.—Stepped sample of a B.I.C.C. 275 kV impregnated pressure (gas-filled) cable

TABLE 4

LOADS AND LOSSES OF SINGLE-CORE CABLES FOR DIRECT-CURRENT TRANSMISSION OVER 350 MILES. ONE CIRCUIT OF TWO CABLES; ONE POSITIVE TO EARTH AND ONE NEGATIVE

Voltage to earth (kV)	Conductor area sq in	Current, A	Resistance, ohms	Copper losses (MVA)	Load (MVA)	Losses per cent
200	0·2	300	157	14·14	120	11·8
	0·2	400	157	25	150	15·6
	0·3	450	100	20·2	180	11·2
	0·3	600	100	36	240	15
300	0·2	300	157	14·14	180	7·85
	0·2	400	157	25	240	10·4
	0·3	450	100	20·2	270	7·5
	0·3	600	100	36	360	10
400	0·2	300	157	14·14	240	5·9
	0·2	400	157	25	320	7·8
	0·3	450	100	20·2	360	5·6
	0·3	600	100	36	480	7·5
500	0·2	300	157	14·14	300	4·7
	0·2	400	157	25	400	6·2
	0·3	450	100	20·2	450	4·5
	0·3	600	100	36	600	6·0

TABLE 5

	Comparative a.c. and d.c. voltage ratings				
System voltage a.c. kV ...	33	66	132	220	275
Equivalent d.c. kV... ...	100	200	400	660	825

This means it is permissible to increase the system voltage by this ratio so that the approximate voltages shown in Table 5 may be used.

For submarine cables, which may weigh 20 to 30 per cent more than cables for direct burial on land, the length of unjointed cable that can be transported is much greater with d.c. and therefore schemes can be considered which tend to become impossible with a.c. Unfortunately d.c. transmission lacks the simplicity of the a.c. transformer substation, owing to the valves which are required in circuit with the transformers, so the terminal equipment is complicated and expensive. In general, its first application will be for projects where the use of a.c. is difficult and more costly, e.g., very long overhead transmission lines or where large blocks of power have to be transmitted by cable for considerable distances.

In May–June, 1953, a major advance in the utilization of high-voltage d.c. submarine cables was made by the laying of a 90 km length of cable from the Isle of Gotland (a few kilometres south of Visby) in the Baltic Sea to the Swedish mainland (off Vaestervik).[12] The conductor is a 0·14 sq in solid copper rod, insulated with 0·275in radial thickness of paper insulation, and protected by two lead sheaths. Over these lead sheaths are applied two dry papers and a heavy layer of jute roves followed by a single layer of 0·160in diameter steel wires for the normal submarine section with a second layer of 0·232in diameter steel wires for the rocky sections of the route near the land ends and then a final overall covering of compounded jute roves.

The overall diameter of the double-wire armoured cable is 2·77in and of the single-wire armoured cable 2·0in. The weights are $32\frac{1}{4}$ and $16\frac{1}{8}$ lb per yd. The Gotland submarine power cable has a total weight of about 900 tons and is the longest cable of its type laid to date. Finally, it is important to appreciate that high-voltage a.c. and d.c. schemes are complementary and their use will be determined on economic grounds in the earlier stages of d.c. developments.

Future Trends and Possibilities

No cable system is yet available which always provides the optimum technical and economic[13] solution and many factors have to be considered when assessing and reviewing super-voltage cable projects. A desirable future trend will be a reduction in the number of designs of cables and their accessories for operation at the still higher voltages (e.g., 275 kV and 380 kV) required in the future, together with a further simplification of terminations, joints and jointing techniques.

Screening the conductor of super-voltage cables results in an increase in the electric strength of the cable but very careful process control is essential with this technique to ensure the screen is correctly and uniformly applied. Technical improvements also result from the use of very thin insulating papers, but again great care is necessary with the paper tension and method of application adopted in the factory and the handling technique used for installation.

Since the Ferranti cable was put into service in 1891 power cables for transmission and distribution have used an oil-impregnated paper dielectric built up from narrow tapes wrapped round the conductor, but it may be that thermoplastic dielectrics (such as polythene) or other new synthetic dielectric materials will be developed which can be applied either by lapping or by a rapid (cheaper) extrusion technique.

Aluminium-sheathed super-voltage gas-pressure or oil-filled cables which eliminate the need for metallic reinforcing tapes are also a future possibility.

Hydrogen, oil, or water cooled cables also offer technical possibilities for certain types of installations where very heavy loads have to be transmitted. It is quite possible, therefore, that the next few years will reveal new and drastic departures from established technical and manufacturing techniques in the cable making industry.

The author is indebted to the Chief Engineer, British Electricity Authority, for permission to publish this article.

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American Engineering Award

AT the Edison Electric Institute's annual convention held recently at Atlantic City, N.J., Mr. Philip D. Reed, chairman of the American General Electric Co., presented the Charles A. Coffin medal for outstanding achievements during 1953 to Mr. Philip Sporn on behalf of the American Gas & Electric Co. The award was made to the company for its pioneering work in the construction of the nation's first 330 kV transmission line and the manufacture of a 120,000 kW super-critical-pressure generating unit. The latter, which is to be installed in the Philo plant of the Ohio Power Co., is a developmental machine operating at 4,500 lb/sq in.

Eastbourne Convention

REPORTS OF FUNCTIONS AND DISCUSSIONS

IT is common form to describe all conferences of the type of the British Electrical Power Convention at Eastbourne last week as very successful. In this case, however, the description is really applicable and all those who attended must have acquired useful knowledge as well as valuable social contacts.

The proceedings ended on Friday morning last with the annual general meeting. At this, after the usual formalities, the President said that it had been decided that past-presidents should remain members of the Council although only the two immediate past-presidents would have voting powers.

The following alterations in representation on the Council have been made:—Association of Consulting Engineers, Mr. Bryan Donkin (vice Mr. J. R. Beard); British Electrical Development Association, Mr. S. F. Steward (vice Sir Henry Self); B.E.A. and Area Boards, Messrs. D. Bellamy and J. S. Pickles (vice Messrs. H. Nimmo and S. F. Steward); British Refrigeration Association, Mr. T. Whittaker (vice Mr. E. G. Batt); Cable Makers' Association, Mr. A. H. Carmichael (vice Sir John Dalton); and National Register of Electrical Installation Contractors, Mr. P. V. Hunter (vice Mr. R. Birt). Mr. W. K. Allen has been elected to the Council as representative of the Jersey Electricity Co., Ltd.

Mr. Beard then introduced Sir Harry Railing as the President for the ensuing year and invested him with the badge of office. Sir Harry Railing, in thanking the Convention, said that he believed he had been selected not only as a manufacturer but also as a former electricity supply engineer and administrator; the two branches were and always must be inseparable.

Mr. Beard then submitted the nomination of Sir John Dalton as vice-president and said that Sir John had represented the industry from many sides. He was a barrister with treatises on electricity supply law to his credit; he was president of the Electrical Industries Benevolent Association; and he was chairman of the Henley group of companies. He was previously director and manager of the County of London Electric Supply Co. and during the last war was Regional Fuel and Power Controller for London and S.E. England. He had also had distinguished Territorial Army service.

Sir John Dalton, in acknowledging his election as vice-president, promised all support in his power to Sir Harry Railing during his year of office.

Left: Mr. J. R. Beard investing Sir Harry Railing with the President's badge. Right: Mr. P. V. Hunter proposing a vote of thanks to Mr. Beard

Mr. Beard then announced that the Council had accepted an invitation from the Corporation of Margate to hold next year's Convention in that town during the week commencing 6th June. He said that the number of suitable places was very limited but Margate could offer the finest meeting hall in the country and had adequate hotel accommodation. There was a site of 28,000 sq ft available for the exhibition.

Mr. J. R. Potts and Mr. D. D. Walker questioned the wisdom of holding the Convention in Margate but after Lord Citrine had pointed out the difficulty of reversing the Council's decision and had said that Margate had been used for conferences by the two principal political parties, they withdrew their opposition.

The thanks of the Council and delegates was expressed to all those who had assisted in making the Convention a success—including the Mayor and Corporation of Eastbourne, Mr. N. Elliott, chairman of the South Eastern Electricity Board, Mr. N. Boydell, the local Sub-Area manager, Mr. V. W. Dale (E.D.A.), and Mr. J. W. Bird, hon. secretary of the golf competitions, assisted by Mrs. E. B. Sawyer.

Mr. P. V. Hunter moved a vote of thanks to Mr. and Mrs. Beard and the proceedings ended.

DISCUSSIONS ON PAPERS

In opening the discussion on Sir George Nelson's paper "Electrical Engineering in World Trade," which was summarized in our last issue, Mr. D. Maxwell Buist (export director, B.E.A.M.A.) said that the electrical exports of this country were now so close to those of the United States, which had wrested from us the leadership that we held before the war, that but for a slight recession last year we might have regained the international championship; the figure was about £233 million for America and £220 million for this country. Great Britain had built more hydro-electric plant overseas than had any other country, and the total capacity of British hydro-electric plant throughout the world was probably as great as that of all plant of that type produced in the United States. We had more than ample capacity to meet any demands from home and overseas for water turbines. There could be no doubt that the comprehensive or "turnkey" method of tendering had attractions for the under-developed countries, and some means had to be found of meeting this new competitive practice.

Sir Harry Railing, vice-president, emphasizing the inter-dependence of the home and export markets, said that no industry could continue to export without an adequate and reasonably assured home market, and no industry could continue to produce efficiently at home without risking the spending of money abroad and thereby retaining a share of the foreign markets. Thirdly, no industry could plan forward with imagination and spend adequate sums on modernization and research until the full importance of the interplay of these factors was recognized.

Mr. E. C. Holroyde (Crompton Parkinson) expressed surprise that Sir George Nelson, in view of the importance which he attached to research, had not laid more emphasis on it in the paper. A great deal was being done both under public auspices and by private companies, but it was essential

to devote more and more time and money to research if this country was to maintain the lead in future, particularly in view of the prospect of development of atomic power.

On certain projects British firms were already using the method of the "all-in bid," but means must be found of applying it to bigger jobs, so that this country could meet American and German competition. It would remain desirable, however, for the buyers to have their independent consulting engineers to see that everything was done properly. Industrialists greatly appreciated the help given them by the B.E.A. in the development of new products, which helped overseas trade by providing a "shop window" for overseas customers.

Mr. W. A. Coates (Metropolitan-Vickers) said that his company had found, by independent inquiries which they had carried out, that, taking the world as a whole, there was no significant difference between the rate of growth of hydro-electric plant and the rate of growth of steam plant. What was important was that it might not be possible to keep up the rate of hydro-electric development; Canada, for example, had almost used up all the water available in places where power was needed, and was having to turn to steam plant.

Mr. H. G. Nelson presenting Sir George Nelson's paper

The exports of the British electrical industry had risen in recent years partly owing to a newly-developed market for domestic appliances, radio and so on, but while this was desirable it was a little risky, since there was a danger of local manufacture developing in this trade. Before the war this country had been predominant in the export of capital electrical goods. In 1930 the United Kingdom was ahead of both Germany and the U.S.A. and shipped roughly one-third of the total capital plant exported, the percentage rising to over 45 in 1938. For the first two years after the war the U.S.A. took the lead, but this country was now ahead again. That was most important, because this heavy plant, the production of which depended so largely on technical ability and very large capital expenditure, should provide a continuing market. Before the introduction of 275 kV transmission in this country British manufacturers had been making transformers and switchgear for higher voltages in the export market than at home.

The idea of the consortium was at least thirty years old; only the name "turnkey" was new. In some countries with no established standards the purchasers adopted their own, and a good deal depended on the ease with which they could look up the standards of the supplying countries. The Germans and Americans told the whole story in one volume, but for switchgear, for example, it was necessary to read about twenty British specifications.

Sir John Hacking (Merz & McLellan) emphasized that there had been no under-planning on the part of the supply authorities. Immediately after the war the C.E.B. looked fifteen years ahead and made the best estimates possible of the load likely to mature during that period. That confirmed their belief that the programmes required were at least double what had been achieved before the war, and they put the position to the manufacturers. The supply authority had been planning programmes of up to 1,900 and even 2,000 MW, and Lord Citrine informed him that Treasury approval had been received for expenditure at a rate for approaching 2,000 MW per annum.

They had first considered transmission at 380 kV ten years ago, and the designs adopted for the 275 kV supergrid provided for the possibility of increasing the voltage to 330 kV, if insulator technique could be improved. Intensive research was needed to enable some improvement to be made in long chains of insulators. At present the concentration of voltage at the ends of the strings was very great and the units in the middle did very little work.

The economics of railway electrification usually seemed very promising because the non-condensing steam locomotive was so ridiculously inefficient; but if a more economic form of independent prime mover was developed, such as the gas turbine, which would have double the efficiency of the steam locomotive, it was doubtful whether so good a case for electrification could be made.

Sir Vincent de Ferranti, who also referred to comprehensive projects, recalled that at Deptford his father had been both the consulting engineer and the contractor. Such a scheme might work for a time, but not in the long run. They must be careful of the argument that the Americans were doing this and that. The Americans had anti-trust legislation, which we were foolishly trying to copy. "Do not let us ape these people," he urged, "when in many ways we are far ahead in our general culture and development." Consulting engineers had a much wider field to draw on and must always in the end be able to give the client a better job.

Mr. V. J. F. Brain (Sydney, Australia, Electricity Supply Authority) said that Australia was free to buy in any market, yet her installed generating plant was almost 100 per cent British, because experience showed that on the whole British equipment presented the best value, and they would go on buying it in future.

Mr. H. Nimmo (Southern Electricity Board) said that in 1930 the world's hydro-electric resources had been assessed at 700 million h.p., but at the time of the World Power Conference in 1950 that figure had been raised to 1,100 million, and as more information became available he thought the latter figure would be found to be too low. Even for Scotland the estimates of potential output had been nearly doubled in recent years. For Europe a possible output of 491,000 million kWh from hydro-electric plant had been forecast, and the French were building 23 stations on the Rhone. The possible output from the great rivers which rose in the Himalayas had also, he thought, been underestimated.

Mr. D. P. Sayers (Midlands Electricity Board) pointed out that 89 per cent of the electrical imports to Canada did not come from this country and, in view of the fact that Canada was commissioning something like 1,000 MW of new plant per annum, asked whether British manufacturers were doing enough to capture the Canadian market.

Mr. H. G. Nelson replied briefly to the discussion, leaving his main points to be dealt with in the "Proceedings."

Modern Methods in the Home

The joint discussion on the papers by Mr. W. J. Jones ("Lighting in Industry, Commerce and the Home") and Dame Caroline Haslett ("Electricity in the Modern Home") had, for lack of time, to be limited to one speaker only, but Dame Caroline's paper which, in her absence owing to indisposition, was presented by Miss P. J. Thompson, B.A., was followed by a forum in which five women from the electrical industry answered questions put to them

In Dame Caroline Haslett's absence her paper was presented by Miss P. J. Thompson (left). Afterwards Miss Vera Norvick (right) put questions on electricity in the home to a panel of five women

by Miss Vera Norvick, amplifying the information given in the paper.

Miss Joan Whitgift, with experience of both the supply and the manufacturing sides of the industry, emphasized the importance of the working space for the housewife provided on the modern cooker and of the new automatic time switch, which made it possible to put a meal in the oven before going out in the morning and on returning home at night find it hot and ready to put on the table.

Miss J. M. Clapperton, who spoke with special experience of modern methods of heat control for cookers, thought that this country was ahead of others in, for example, methods of boiling plate control. The infinitely variable heat control switch or energy regulator had revolutionized the modern electric cooker, giving the housewife complete control. A more robust boiling plate was now available, and it was of great advantage to be able to see the heat. British manufacturers had now started to put a pilot light above each switch, which not only showed when the switch was "on," but gave an indication of the degree of heat.

Mrs. M. Windsor, a housecraft adviser with wide experience of the problems in an industrial area, expressed the opinion that the greatest contribution made by electricity to easing the drudgery of housewives in the lower income groups was the provision of hot water on tap and washing machines, and also on certain housing estates the communal laundry which made it possible to wash and dry a complete family wash in an hour and a half. These loads helped the supply industry by filling in the gaps between peaks. In communal laundries the water for a complete day's wash was heated during the night, the water heaters being specially designed to allow cold water to flow into the heater only when the current was on. The current was controlled by a time switch and automatically cut off at peak hours. In blocks of flats for industrial workers she would like to see the hot water supply combined with a refrigeration plant, so that it would supply both hot water on tap and a cold cupboard in each flat. That would be an obvious advantage to the consumer and help to make even more people realize the benefits of refrigeration.

Miss Dorothy Taylor said it was frequently the case that the farmer's wife, in order to secure electricity for household purposes, managed to convince her husband that he needed it for milking his cows and for other purposes about the farm. The home was thus an important factor in promoting rural electrification. The home freezer was changing the lives of many women in rural areas to-day; it even enabled the countrywoman to do her Christmas cooking in November and so be free to enjoy the party when Christmas arrived. Miss Taylor said the people who went to the new towns wanted as many electrical appliances as they could get, but at the start economic pressure confined their purchases to essentials. They usually started by buying an electric cooker and an iron, and it helped considerably if adequate purchasing facilities were available. After a year or so they would buy an immersion heater and perhaps a vacuum cleaner, and then perhaps a washing machine or wash boiler. If purchase tax was reduced and hire purchase restrictions eased they would probably go on to buy a refrigerator. From experience in Canada she thought that Canadian housewives would be proud to have many of the small electrical appliances manufactured in this country, though some of them might need modification to comply with domestic requirements and Canadian standards.

Finally, Miss M. V. Griffith, a physicist in charge of heating research at the Electrical Research Association, described the mechanism of a small dual-purpose heat pump suitable for domestic use, which might be sold for not much more than the cost of a refrigerator and water heater combined. In hot countries, she remarked, a heat pump run in reverse could be used to cool the same building which it heated in the winter, and even in our own ephemeral and problematical summers such an apparatus might be useful. An investigation had also been conducted into the problems of drying cupboards in which a certain amount of air movement as well as heat played a part. This should use the minimum of electrical energy, because it did not require so much to produce air movement as to provide heat. She hoped, therefore, that they could look forward to the time when users of electricity could no longer be accused of extravagance for using high grade energy for space and water heating.

"Selling" Lighting

Mr. S. F. Steward, chairman, South Western Electricity Board, the only speaker for whom time could be found in the discussion, commenting on Mr. Jones's paper, said he felt that the development of really forceful modern selling techniques might have been hampered in the supply industry by the very fact that their product was inherently so superior. The striking demonstrations which Mr. Jones had given should stimulate their imagination and lead to an improvement in that respect. It was necessary to sell lighting, not lamps; the selling of lamps and other appliances would follow the sale of lighting.

Mr. Jones had brought out the tremendous progress made in lighting, the value of the load to the supply industry, and the need for effective selling. The amount of light which could be provided for very few kWh would be almost alarming to the supply industry but for the fact that as lighting efficiency improved so the sale of kWh for lighting increased. Intensive lighting development was of great use to the supply industry in improving the load factor and in securing fuller use of the higher-priced kWh in the early blocks of the tariff. It was essential to see that consumers used to the limit these early, higher-priced, kWh because only by that means was it possible to recover from them their proper share of the fixed costs and be able to claim that electricity for cooking, water heating and so on was sold at a penny per kWh or less. Dame Caroline had referred to the four foundations of modern living, and lighting development was the rock on which those four foundations could be erected.

Mr. W. J. Jones introducing his paper on lighting developments

Dame Caroline's paper provided a most valuable survey of modern developments in domestic appliances, and he would in particular emphasize the value of visible heat in cookers, to offset the claims of the gas industry in that respect, and the need for more socket outlets, which also required an all-out campaign and without which much development would be frustrated.

Mr. J. Eccles (B.E.A.), in proposing a vote of thanks to the authors of the two papers, said Mr. Jones had shown that British manufacturers were now ahead of their competitors in the lighting field. It was remarkable that, although electricity had a virtual monopoly of lighting, so much was continually being done to make it better. He hoped that Dame Caroline's paper and the subsequent contributions could be embodied in book form and sent abroad, and in particular to the Commonwealth, where there was any amount of good will for British manufacturers but not enough knowledge of what they were doing.

Domestic Load Development

Mr. D. Bellamy, in presenting his paper on "The Development of the Domestic Load at Home and Overseas," mentioned that in the first five months of 1953, before the policy which he advocated was being pursued, the cooker output of the Yorkshire Electricity Board had been fewer than 3,000 and the output of immersion heaters fewer than 1,000. In the first five months of 1954, on the other hand, the figure for cookers had risen to over 10,000 and for immersion heaters to more than 14,000.

Mr. N. F. Marsh (E. Midlands E.B.), who opened the discussion, said that in spite of some disadvantages he thought it necessary to adopt long-term hire purchase; by

going to ten years the weekly payment on cookers could be reduced to 1s 8d. There were some consumers, however, who could not or would not pay even this small amount, so that there was a definite field for simple hire. A great many undertakings had built up their cooker load on simple hire. For this purpose it was necessary to adopt something as near as possible to manufacturers' standard lines of production, thus giving them a chance to bring prices down, and the cost to the consumer could be reduced to 1s to 1s 2d a week.

Mr. A. N. Irens (S. Western E.B.) said that there was a feeling among industrialists that the industrial tariff had been raised to a maximum in order to subsidize the domestic consumer. In the old days there might have been a modicum of justification for this view, but to-day the domestic drive which was being made was in the direct interests of industry, because it improved the load factor, and a 10 per cent improvement in load factor reduced the cost per unit by 20 per cent. It should also be brought home to industry that industrial tariffs were based on the real cost of supply and involved no political considerations.

Dealing with Appendix 3, Mr. R. Y. Sanders (B.E.A.) suggested a footnote pointing out that in 1937–38 capital charges, local rates and so on were included in the lump sum of £66 million and excluded from energy and distribution costs, a procedure which differed from that adopted in 1952–53. This, however, did not invalidate the overall fixed costs of £10·35 and £10·59 per kW of m.d. Before the war the industry spent large amounts of capital for future development, whereas since the war it had suffered from capital starvation. Mr. Bellamy had been over-generous to solid fuel in his cost comparisons. The Ridley Committee figures which he used were sample figures for one set of conditions only, for continuous room heating, but what mattered from the national point of view was the overall average for all uses, year in and year out.

Mr. A. M. F. Palmer, M.P., on the other hand, congratulated Mr. Bellamy on taking his stand on the Ridley Report and on being prepared to say " substantially electrical " in places where in the 1930's they might have said " all-electric." There should be consumer choice and genuine technical competition on a basis of true cost. The Ridley Report should be the foundation of a rational fuel and power policy in a free society. For some classes of load electricity was unchallenged, but there were other classes where a realistic partnership was more likely to satisfy public opinion. He had always regarded the Consultative Councils as one of the weakest aspects of the Act of 1947. The best public relations officers of the industry were bound to be its staff and employees, and it was important that they should be educated in the principles of the industry's price policy.

Mr. D. P. Sayers (Midlands E.B.) said that Mr. Bellamy had shown that about one-third of the fixed costs of distribution were related to consumers rather than demand. Tariffs should be constructed so that these true costs were covered by the fixed charge or the charge for the first block of units, thus opening the way to a more favourable follow-on charge. In that connection the bulk supply tariff would need reconsideration. There was now enough modern plant available to run for the whole of the base-load period at fairly high efficiency, whereas the cost of the last 50 MW of plant to meet the peak was probably three times the base-load cost. The grid tariff was an average figure taken over the 24 hours, but a day and night differential might be introduced which would bring pressure on the Boards to offer better terms for off-peak load and thus encourage a high load factor. The supergrid should enable the B.E.A. to take full advantage of the cheapest costs of production. At the moment the domestic load was easy to get, but there were just as great potentialities in the industrial load.

Miss Vera Norvick (E.A.W.) emphasized the need for good hire-purchase schemes, simple-hire facilities, and a better follow-up service after equipment had been installed. She recalled that thirty years ago, when she first entered the electrical industry as a demonstrator, a municipal undertaking in London built up a very large domestic load by the hire of cookers, and later of water heaters, with a special night load tariff of about three units a penny.

Mr. R. Birt (Southern E.B.) said that the suggestion of increasing the price for the first block of units to recover the capital expended in providing a supply might meet with considerable administrative difficulties, and possibly legal difficulties in complying with the 1947 Act.

Mr. H. J. Beard (consulting engineer) said that in 1951 the Union of South Africa sold 11,000 million kWh, which meant that the consumption per head was 920 kWh, although the population of 12½ million included 8½ million natives. Since the war the load had increased so rapidly that there had been no need for sales promotion, but in the eight years before the war the energetic sales campaign adopted by the Cape Town Corporation increased the domestic sales from 37½ million to 151 million kWh; in that period 28,000 cookers and 15,000 water heaters had been sold to 51,000 consumers. Eighty per cent of the cookers were sold on hire purchase, the Corporation being responsible for maintenance for the first two years. The Cape Town campaign had been so successful that the gas undertaking never recovered. In Rhodesia since the war the load had increased by about 18 per cent compound per annum, and in view of the high cost of generating plant it had been necessary to consider every way of reducing the maximum demand. Attention had therefore been given to the remote control of water heaters without inconvenience to consumers, and in a large town in Southern Rhodesia it was considered that when the load grew to 110 MW it might be possible by this means to reduce the peak demand by 20 MW.

Mr. D. Bellamy's paper surveyed domestic load development at home and overseas

Mr. J. A. Sumner (Eastern E.B.) referred to the use of the small domestic heat pump to capture the domestic space heating load and suggested that if the electrical industry did not take it up other industries would do so. Such a heat pump must provide a high continuous standard of heating at a cost not exceeding £30 per annum for full heating and £20 for background heating, for a house of 1,500 sq ft. It must have a demand not exceeding 4 kW with an annual load factor of the order of 20 per cent, and it must be available at a capital cost no greater than that of the refrigerator, domestic boiler and water heater which it would displace. He hoped that by 1955 or 1956 a heat pump fulfilling those conditions would be available.

Mr. W. K. Allen (Jersey E.C.) believed that the highest expenditure of an Area Board in this country on publicity was 0·3 per cent of the revenue, while the equivalent American figure was 0·6 per cent. In Jersey during the present year he had tried the effect of spending 0·8 per cent of the revenue from electricity on publicity, and for an extra expenditure of £1,100 an additional showroom turnover of £27,000 had been obtained. Compared with eighteen months ago, their cooker sales were up twelve times and their water heater sales fifty times. They offered to put in cookers, refrigerators and washing machines on loan for a fortnight free, and they had never had one back yet.

Mr. S. W. Hazell (Eastern E.B.) maintained that a very big selling point which electricity had over other fuels was that in the home it could be made completely safe. He did not think that the industry emphasized this point sufficiently.

Mr. Bellamy replied briefly to the discussion.

Installation Practice

Opening the discussion on Mr. S. L. M. Barlow's paper entitled " The Comparison of Installation Practice at Home and Overseas," Mr. C. J. Veness (E.C.A.) referred to the system of permits for installation work in Canada and asked whether, with all the delays which it must entail, it was really desirable for repairs and extensions. In dealing with the percentage fill for conduits he wondered whether any con-

sideration was given to the total loading of the conductors, because when there were a number of conductors in a conduit or trunking it often happened that several of them were merely lightly loaded control wires.

Mr. P. McKearney (Ministry of Works) suggested that pre-planning must include, in addition to those branches of specialist knowledge peculiar to the contractor, a knowledge of the use of the building in great detail, the habits of its occupants, the layout of furniture or plant, and the layout of other services in the building. This required a high degree of co-ordination at the earliest possible stage. Modern architects were becoming alive to the need for co-ordination, but with the increasing complexity and cost of engineering services a new type of trained co-ordinator might be needed. Perhaps the most valuable lesson to be learned from the United States was the need for increased use of up-to-date power-operated tools. He had compared the costs of major installations in the U.S.A. and in this country, and had found that the comparison, both in cost and in time, was if anything in favour of British practice. In organization he was certain that the electrical industry in Great Britain was supreme, providing an example of co-operation which, harnessed to effective competition, made for a highly efficient industry not matched anywhere else in the world.

Mr. D. D. Walker (B.E.A.M.A.), commenting on the figure of 107 electrical fatalities in 1951, remarked that although Mr. Barlow described this as "not very formidable" it was obviously excessive by precisely 107. It would be interesting to have the corresponding figure for America, in spite of the differences in conditions which would have to be taken into account, and, if it proved to be higher despite the lower voltage used there, the reason might be that the testing in America might not be of such a high standard as here.

Mr. S. L. M. Barlow's paper was concerned with installation methods and costs

Mr. H. W. Swann asked whether Mr. Barlow thought that the 13th edition of the I.E.E. Wiring Rules should devote more space to maintenance and repairs than had been given hitherto. It might be advisable to deal more adequately with maintenance and upkeep, and possibly the contractor who undertook the wiring of a building might include an offer for perpetual maintenance, also of a contractual character. The figure of 107 fatal accidents in 1951 was lower than in previous years, so that the electric shock risk might be diminishing, but the fire risk, which in his opinion did not receive enough attention in the 12th edition of the Regulations, was rising. In 1937–38, 8 per cent of the total fires had been due to electricity, whereas in 1951 the figure was 18·23 per cent.

Dr. H. H. Ballin said that it was often difficult, in comparing practice abroad and at home, to take into account all the relevant factors. For example, the 80 W fluorescent tube was the most popular size in this country, whereas in the U.S.A. the 40 W size had been standard. The 80 W size, in view of the larger amount of light provided per pound of capital expenditure, was of great advantage where American conditions of supply did not obtain, and in Australia there had been a trend towards it recently. Another difference was that 50 per cent of the fluorescent tubes used in the U.S.A. were equivalent to the British daylight colour and only 10 per cent were warm white and "de luxe" colours, for which there was a much greater preference in this country. If this were due to the much higher values of illumination which applied in the United States it might mean that when values in this country went up there would be a move towards a cooler colour.

Mr. J. D. D. Shaw (E.C.A. of Scotland) emphasized that a contract pre-planned and carried out without modification was more profitable than one with a large bill for extras or variations. Particularly in new buildings, the electrical installation should be something which was built into the structure and not something which was stuck on. His firm had succeeded not only in pre-planning but also in prefabricating electrical installations for large housing developments, thus cutting costs by half. The proposed National Inspection Council might help in co-ordinating the various interests.

Sir Vincent de Ferranti mentioned that in the all-electric home which he had started 25 years ago there were no fuses; he relied entirely on small circuit-breakers.

Mr. T. W. Heather said that the electro-galvanized finish widely used in the United States had been experimented with in this country in times of zinc shortage recently, but the conclusion reached was that it was useless in our climatic conditions, and the tests showed that it had no greater corrosion resistance than a good quality enamel finish. The internal knurling used in America was also well known to British manufacturers, but they doubted whether it had practical value; it seemed more in the nature of a selling point. They were also sceptical of the value of the special internal lacquers advertised in America.

Competition in this country in the supply of installation materials, particularly in the conduit field, was intense, and everybody made what was simplest and cheapest to make. It might well be that some of the ideas to which Mr. Barlow had drawn attention should be adopted, even if the particular article was a little more expensive, because it would make the whole job cheaper.

Mr. C. A. Cameron Brown (B.E.A.) said that British manufacturers had provided non-metallic cables for farm wiring, but so far they were only suitable for single-phase and the simpler installations; for three-phase and the more complicated installations it seemed necessary to resort to conduit of some kind, and it seemed that plastic conduit might be suitable. For farm and small factory installations in Scandinavia and Holland a homogeneous multi-core cable was used for which no screwing tools were required.

Mr. Barlow, in replying to the discussion, said that in dealing with the percentage fill of conduits the Americans did not consider the loading of conductors, but in his view this should be done if this were adopted in Great Britain. He thought it would be an excellent idea, because it made it possible to work out the capacity of conduits with dissimilar conductors. As to safety and reliability, it was not often the original installation which gave the trouble, but the additions made by the occupants of the building. In the United States there was an enormous sale of apparatus and wiring with detailed instructions on how to put it in. The undertaking of maintenance of an installation by a contractor after installing it required urgent consideration.

Mr. Forbes Jackson, who proposed a vote of thanks to Mr. Barlow, referred to Post-War Building Study No. 11, which provided for a new wiring system with a ring main which made the provision of large numbers of socket outlets easy. He regretted the I.E.E. decision to continue the wartime up-rating of cables. There was a saving in copper, but an addition to the watts loss. He had been responsible over the last twenty years for wiring about 150,000 houses, and had done a large number of these with light-gauge conduit and grip connectors, to a first-class specification and with considerable saving in cost.

Electrical Forum

An "Electrical Forum" was held last Friday morning, at which questions submitted by delegates were answered by a panel which had not seen them beforehand. The President acted as question-master, and the panel consisted of Lord Citrine, Sir John Dalton, Sir Vincent de Ferranti, Sir John Hacking, Alderman I. J. Hayward (chairman of the London Consultative Council) and Sir Charles Westlake.

The first question was whether the B.E.A. was able to make effective representations to the National Coal Board regarding price increases. Lord Citrine outlined the steps open to the Authority, but added that he would not like to say how far it was felt that they were completely effective. Sir John Hacking added that strong representations had been made to the Coal Board that the price of coal

At the Electrical Forum. Left to right : Sir Vincent de Ferranti, Sir John Hacking, Sir John Dalton, the President, Lord Citrine, Sir Charles Westlake and Alderman I. J. Hayward

should be based on its calorific value, with allowance for ash content. The present price structure had effected a substantial improvement in the position of users of the very low grade coals.

Dealing with the second question, " How Can the National Load Factor be Improved ? " Sir Vincent de Ferranti asked what load factor the supply industry would like to see, having in mind that time must be available for the overhaul of plant. Sir John Hacking said that it was difficult to carry out maintenance programmes in the South Wales Division, where the load factor was about 60 per cent, so that 60 per cent might well be the target. If the time needed for boiler maintenance could be reduced, as by greater concentration on pulverized fuel firing, a further improvement would be possible. The policy was to improve the load factor by greater diversity of use, which was why they were so anxious to develop the domestic load. Sir Charles Westlake remarked that in his experience at home and abroad the domestic user provided the highest load factor of any single type of consumer.

Lord Citrine pointed out that 15 per cent of their plant was over 25 years old and was called into service only at peak periods, while on modern plant the load factor could be as high as 87 per cent. Probably the load factor of industry as a whole was well under 30 per cent; the B.E.A. load factor last year of 48 per cent was, therefore, not too bad.

The next question concerned the efficiency of Consultative Councils, which were defended by Alderman Hayward as an experiment which worked well. They should be judged, he contended, not on the number of grumbles produced but on their co-operation with and co-ordination in the work of the Boards. Sir John Dalton took a less optimistic view and believed it would be better to revert to the position of the local authority representing the consumers in its area, but to this Alderman Hayward retorted that it would mean in London that the Board would have to go to some eighty different authorities, on none of which industry had any direct representation.

The panel were then asked whether the activities of the Monopolies Commission to date had been beneficial to the country as a whole, and whether they approved of the continuance of the Commission as a permanent body. Sir John Dalton, while agreeing that there was room for a competent body to investigate true monopoly, described the present set-up as " a dead loss." It had taken, he said, about six years to produce three or four reports. One of these recommended that the cable industry should disclose to other buyers what the B.E.A. paid for its cables. " The first people to shout about that," he added, " were the B.E.A., and quite rightly."

Sir Vincent de Ferranti suggested that one way in which the Commission could do infinite harm would be if it were made illegal to agree a level of price with one's competitor.

Lord Citrine said that the community was entitled to know the extent to which trustification, price agreements and so on existed in any industry, and he did not see how this would be practicable without a permanent statutory body. On the other hand, anti-trust legislation in any country had been a failure, and in America had not got rid of monopoly. He would say that British industry was very much less in its practices a menace to the public interest. The B.E.A. was conscious that unrestricted competition could not ultimately be in the interests of anybody. Competition must be based on fair standards and must not drive down the standard of life of the working people, as had happened too often in the past. Moreover, in modern industry a fair price margin was essential. The B.E.A. felt that it was much better for firms, through their associations and through special arrangements made for the purpose, to give it in confidence reasonable assurance of what their costs were. While the Monopolies Commission might be necessary as a public body, he would infinitely prefer to rely on the sense of fair dealing of those with whom the Authority had continuing relations.

To the question of whether the adoption of new techniques by British industry was sufficiently imaginative and bold to maintain its reputation for technical ability and skill in the face of foreign competition, Sir Charles Westlake replied that in Uganda they would never buy from anybody but British firms, and they had had complete satisfaction from every British firm with which they had dealt. He felt that British manufacturers might copy American practice to the extent that their domestic apparatus should not only be efficient but look efficient.

The panel were then asked whether the considerable efforts which British engineers were devoting to international technical organizations such as the World Power Conference and C.I.G.R.E. were worth while. Sir John Dalton expressed the view that the standard of the papers at international congresses had deteriorated in the last four or five years, but otherwise the panel were unanimously in favour of such international contacts.

The next question was whether the productivity teams which visited the U.S.A. were worth while. Lord Citrine was dubious about their value from the point of view of the technical information which they brought back, preferring the sending of technically well-equipped people to inquire into particular questions. On the other hand, he thought it a very good thing that people should visit other countries and see how their industries were carried on.

Sir John Hacking also believed that they did a lot of good, but said that one disadvantage of them was that they were shown in America the high-spots of the industry they were investigating, and in some cases on returning lauded certain practices as being, by inference, much better than our own, when there were equally good examples in this country.

The question which aroused the most discussion was " What are the Views of the Panel on the Proposal of the London Transport Executive to Substitute for their Trolley-buses Diesel Buses ? "

Alderman Hayward outlined the reasons for which it was understood that the London Transport Executive had made its decision. The trolley-bus required overhead lines, which were undesirable in a built-up area, particularly from the point of view of the fire services. While more mobile than trams, they were not so mobile as the ordinary bus and the turning points which had to be provided at each end of the route caused some difficulty.

Sir Charles Westlake described it as a " tragedy " that the trolley-bus system should be replaced by ordinary buses running on imported oil. In Africa very extensive trolley-bus systems were being considered.

Sir John Hacking said that if the decision had been made on grounds of economics he was astonished that the Executive favoured a method of transport which required imported fuel. Moreover, the exhaust from diesel vehicles must be a very important factor in atmospheric pollution.

Lord Citrine called attention to the fact that the Beaver

Committee in its interim report had demonstrated how small was the amount of pollution due to power stations. He profoundly regretted the decision which the London Transport Executive had taken, but, so far as it involved the need for imported oil, pointed out that this would come from the sterling area and that it seemed apparent that the B.E.A. itself would have to resort to the use of oil in increasing measure for normal generation purposes, as the coal supply of the Authority was becoming less and less adequate for its needs.

They had, however, made strong observations to the London Transport Executive. He had hoped that the use of trolley-buses would be expanded rather than contracted, but he feared that the action taken in London might be national in its consequences.

The question of atmospheric pollution having been raised, the President suggested that the panel should discuss a question which would have come up later, namely whether the electrical industry had contributed to the smoke disaster in November, 1952, and if so what steps had been taken to prevent its recurrence.

Sir John Hacking doubted whether power stations as a whole contributed materially to smoke conditions. If they did, it must be the old stations which were responsible, because at the new stations—Battersea, Bankside and the others—very tall stacks were provided to ensure the widest possible distribution of the gases, which had already been cleaned.

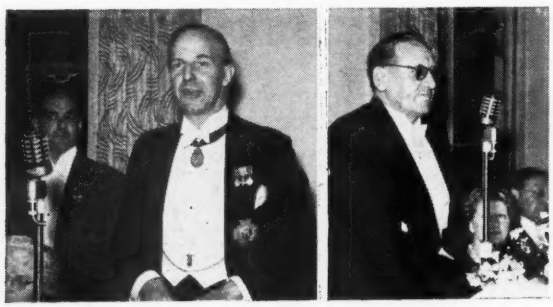
Alderman Hayward said that the London divisional controller, Mr. Pugh, had satisfied the London Consultative Council that the complaints made against the power stations in London were not justified, and Lord Citrine mentioned that tests which had been taken near St. Neots, where there was a station, proved that the atmospheric pollution in the vicinity was actually less than in other rural areas.

The last question asked the panel when the domestic consumer would be able to purchase lamps and appliances without worrying about the voltage or the type of plug and socket used in the house.

Lord Citrine said there were about 1,800,000 people not on standard voltage, and the cost of changing them over would be about £36 million on consumers' apparatus alone. The job was being tackled, but it would take a long time. Without power to prevent the sale of non-standard plugs it would take a very long time indeed before all plugs were standardized.

Annual Dinner

The annual dinner was held at the Grand Hotel on Thursday last week with the President, Mr. J. R. Beard, in the chair. The principal guest was Sir John Maud, K.C.B., C.B.E., Permanent Secretary, Ministry of Fuel and Power, who, in proposing the toast of "The Electrical Industry," observed that whatever might be their feelings towards his Ministry, he believed that fifty years ago they would have felt even more malevolently about its predecessor, the Board of Trade, because no infant industry had ever had a tougher deal from any Government than the electricity industry had had from the Government of this country fifty or more years ago, when the chief interest of the Government had been to restrict and regulate what was looked on as a pretty dangerous, monopolistic industry.



Left: Sir John Maud. Right: Mr. A. R. Sibson

There had been an improvement since those days, and his Minister had asked him to convey his congratulations to the Convention and to wish them all prosperity in their promotional activities at home and overseas.

The Minister had to see that the Authority had the right to borrow money, and there was a Bill before Parliament at the moment which was intended to make a trifling correction in one section of the Act of 1947. That Act, by a curious oversight, only permitted the supply industry to borrow £700 million, with a Treasury guarantee, but the Minister was now correcting that foolish mistake and substituting £1,400 million.

In view of what the partners in the Convention had achieved, it was possible to look to the future with a good deal of confidence. The supply side had managed to meet a demand which doubled every ten years; the manufacturers had increased exports tenfold in the last fifteen years and attained a figure of £250 million in 1953. What was perhaps even more important, the industry had learnt to use the foulest kinds of coal. He concluded with a reference to power from nuclear fission.

The President, who responded, said that the increasing specialization of the electrical industry reduced the possibilities of contact between its different branches, and the Convention performed an essential function in providing an opportunity for the different branches to meet, both technically and socially, and a forum for the discussion of broad problems, so that each branch could get a picture of what the other branches were doing.

At one time there had been a fear that the Convention might overlap with the work of the I.E.E., but he hoped that that fear had been dispelled. The Convention papers were purposely designed on general lines, and the commercial aspect was not frowned upon.

The theme of the Convention being "The Electrical Industry at Home and Overseas," discussion had been concentrated to some extent on exports, and it had been emphasized that the electrical industry was the second largest exporting industry; but he wondered whether if the electrical equipment on the motor vehicles which were exported was credited to the electrical industry it might not move up into the first place. The fact of being the first, or nearly the first, exporting industry placed on it a great responsibility, but he thought that it might look for a little outside assistance in two directions.

The International Bank was now largely responsible for financing electrical undertakings in the under-developed countries, but would make loans only for projects which had been thoroughly worked out by experts and when the expenditure of the money was properly supervised on the technical side. It was most important that British advisers should be employed if British manufacturers were to obtain their share of this business. The advisers who were appointed in the first instance were in a strong position to become those responsible for the scheme, and the British Government should try to see that British firms were appointed to do the preliminary work. The danger there was that American aid was often given for carrying out the preliminary schemes, and so out of gratitude there was a strong incentive for the country concerned to bring in American advisers. Secondly, he pleaded for bolder support by the banks in raising capital for overseas schemes, which were of benefit to the country as a whole as well as to the electrical industry.

The health of the guests was proposed by Sir John Hacking, immediate past-president of the Convention and responded to by the Mayor of Eastbourne, Councillor L. W. Pyle, and by Mr. A. R. Sibson, city electrical engineer of Bulawayo, who said that it had been a delight to him to see the friendliness and good will which existed among all parties to the Convention, particularly after some of the remarks he had heard shortly after vesting date. Mr. Sibson brought to the Convention the best wishes of the Association of Municipal Electricity Undertakings of Southern Africa.

All-Electric Tunnel Kiln

Overcoming the Housing Shortage in East Africa

UGANDA faces an acute housing shortage, particularly in Kampala, Jinja and Entebbe. One difficulty has been the necessity of bringing building materials from Mombasa 750 miles away. To overcome this and meet the demand for cheap and speedy building, the Uganda Public Works Department has decided to make its own tiles and cellular blocks. For this purpose, an electric kiln has been erected at Jinja where there is a good supply of suitable clay as well as adequate electrical power.

The kiln, the first all-electric tunnel kiln to be installed in East Africa, is capable of firing 5,000,000 lb of products per annum, at a temperature of 850 deg C, and was designed and built in England by the General Electric Co., Ltd. Its erection on site, together with the necessary buildings to house it, was carried out by the Uganda Public Works Department.

The kiln has preheating, firing and cooling sections, and an effective length of 100ft. Heating is by nickel-chrome elements 0·20in in diameter formed into 1⅜in diameter spirals, each of which rests in refractory brickwork grooved to receive it. The firing section has automatic temperature control and is divided into three zones each fitted with a pyrometer and fed by a Scott-connected transformer which gives a voltage on the secondary side variable from 103 V to 126 V, two-phase, the incoming voltage being 415 V, three-phase; each zone is rated at 3 kVA. For further flexibility, the outgoing supply from the transformers feeds three sets of busbars on either side of the kiln. It is thus possible to vary the heating arrangements simply by changing the connections from the elements to the busbars.

Bogies which carry the clay products through the kiln have side-angle runners which move in a sand trough to effect a furnace seal. Products are stacked directly on the refractory hearths of the wagons to a height of 3ft above hearth level with a width of stack of 18in. No spacing pieces between ware are necessary. For stability, cellular blocks are stacked first, and roofing tiles above them. The wagons are pushed through the kiln by an automatically controlled hydraulic ram. When a fresh wagon is pushed into the kiln all the wagons move along one space and a fired wagon is pushed out of the discharge end.

An ingenious arrangement, by which exhaust air from the kiln is used to pre-heat the clay to 100 deg C, prevents cracking from over-rapid heating. Although normally the midday atmospheric conditions at Jinja are favourable to the efficient drying of clay, the humidity rises considerably at night and tends to crack products which have reached the last stages of drying. A recuperator type heat exchanger, pre-heating tunnel, and batch drying chambers were therefore designed and erected by the Uganda Public Works Department in addition to the tunnel kiln. The recuperator was included so that the flow of air in the tunnel kiln could be reduced to the minimum required for efficient firing, thus reducing the amount of heat taken away by the exhaust air.

A trial test, without the recuperator, using the minimum quantity of air necessary for the efficient firing of the ware in the kiln, showed that exhaust air taken straight from the kiln into the pre-heating tunnel contained excessive moisture. This condensed on the products in the lower, cooler parts of the pre-heating tunnel and cracked the clay, causing stacks to collapse later when they were passing through the kiln. The wet air from the kiln is used therefore in the recuperator to heat fresh air which is blown into the pre-heating tunnel and from there into the batch drying chambers where it passes into the atmosphere before reaching its saturation temperature.

Birmingham Engineering Centre

BEFORE he opened the Birmingham Exchange's new Engineering Centre on 17th June, by switching on the main power supply, Lord Bennett said that in view of the intense competition which our manufacturers were meeting all over the world, it was not sufficient to have an exhibition just occasionally.

Speaking at a luncheon after the ceremony Lord Bennett said that the Centre was an excellent idea and "filled a gap." It should be valuable if industry had the energy to make it a success, but continuous effort would be needed. The cream of the country's engineering products had been gathered together; there was scarcely anything that an engineering buyer might want that he could not either see on show at the Centre or learn about at its information room. It would also be a centre for meetings.

Mr. Christopher Grazebrook, president of the Birmingham Exchange, explained at the opening ceremony that the Centre would be run as a non-profit-distributing organization and would be open to all. It was, he believed, the only one of its kind in Britain. The only previous permanent engineering exhibition was the centre privately run in Glasgow for several years after the war.

"One of our most important duties will be to encourage firms to export, and especially those of moderate size which normally may not have entered this sphere of activity. We shall do all we can to encourage the foreign as well as the home buyer to visit this Centre."

Mr. Barry Kay, Regional Controller of the Board of Trade and Ministry of Supply, read a telegram from the Minister of Supply, Mr. Duncan Sandys, who said that the opportunity the Centre would give for the display of a wide range of British engineering products in one place could not fail to be a valuable aid to overseas trade.

The Deputy Mayor of Birmingham, Ald. G. H. W. Griffiths, said the Centre was a classic example of working together instead of separately. It was a necessary institution for which the city was thankful.

At the opening ceremony, the Rector of Birmingham, Canon Bryan Green, dedicated the centre "to the promotion of good industry, the development of happy relations between all those engaged in engineering, and the increase of prosperity for all."

The Centre will allow manufacturers in the engineering and allied industries to display their products on a permanent basis. More than 200 firms from all parts of the country have already taken space and there is a waiting list.

An extensive information department has been established with a comprehensive library containing up-to-date trade directories, reference books and catalogues of 7,000 engineering firms. A lecture room has facilities for showing films, while in a coffee room are more than 100 copies of current technical periodicals covering all fields of engineering. The new centre will be open from 9 a.m. to 5 p.m., on week-days and from 9 a.m. to noon on Saturdays. Admission is free.

Transmitters for Scandinavia

Two 200 kW long wave broadcast transmitters are to come "on the air" officially this week-end. One is at Klöfta, Norway, operating on a frequency of 218 kc/s, and the other, at Kalundborg, Denmark, operating on a frequency of 245 kc/s. Both these transmitters have been designed and built by Marconi's Wireless Telegraph Co., Ltd.

PERSONAL AND SOCIAL

News of Men and Women of the Industry

THE Minister of Fuel and Power has appointed **Councillor O. Inman,** J.P., A.M.I.E.E., of Stocksbridge, near Sheffield, and **Alderman A. King,** J.P., of Todmorden, as members of the Yorkshire Electricity Consultative Council.

Mr. B. F. Slater, G.I.Mech.E., G.I.Mar.E., late sales engineer for Borg & Beck Co., Ltd., has recently joined J. & H. McLaren, Ltd., in a similar capacity and will represent the company in the West of England.

Mr. W. E. Macdonald, A.M.I.E.E., who was recently appointed president of the Electrical Society of Glasgow, is a member of the Glasgow Branch staff of the General Electric Co., Ltd. He joined the branch in 1904 and after holding various positions became manager of the Ventilation and Small Motor Department in 1920.

Mr. W. E. Macdonald

Mr. C. J. Penny is resigning his position as sales engineer, London and Southern Counties Area, Mersey Cable Works, Ltd., to take up a similar appointment with the Brush Electrical Engineering Co., Ltd., in its London office. Mr. Penny served his apprenticeship with J. I. Thornycroft, Ltd., in Southampton, and served throughout the war as an electrical engineering officer in the Merchant Navy. For a period after the war he worked as assistant engineer in the Buckingham & Carnatic Mills, Ltd., Madras, India.

Mr. J. M. S. Risk, Ph.D., C.A., F.C.W.A., A.C.I.S., has been appointed controller of accounts of the Brush Group, Ltd., and a director of Associated British Oil Engines, Ltd. He will take up his duties on 1st July. Since 1949 Dr. Risk has been chief accountant of the Southern Gas Board. He succeeds **Mr. M. Tattersfield,** A.C.A., F.C.C.S., who is now deputy managing director of the Brush Electrical Engineering Co., Ltd.

Miss Mary J. Cumming has been awarded the 10th Travelling Exhibition by the Caroline Haslett Trust, which enables holders to study some aspect of domestic electrification in another country. She is the senior demonstrator of the South-West Scotland Electricity Board, Clyde Sub-Area, and was formerly a domestic science teacher in Glasgow. Miss Cumming is especially interested to see how the work of the demonstrator is carried out in Finland and the measures adopted to educate the Finnish housewife in town and country in the right use of electric power.

Mr. E. B. Schofield has been appointed area sales engineer for Lancashire, Cheshire and the West Riding of Yorkshire with Elliott Brothers (London), Ltd. Mr. Schofield will specialize in the electrical measuring instrument side of the company's business and will operate from the Manchester office at 66, Deansgate, Manchester, 3.

The Governors of Queen Mary College are this week advertising for applications for a W. T. Henley Fellowship tenable for two or three years with remuneration of £600-£900 per annum according to qualification and experience.

After thirty-seven years with the General Electric Co., Ltd., **Mr. A. E. Phipps,** deputy general manager of the company's Witton Moulded Insulation Works, has retired. At a farewell dinner party, Mr. R. J. Kaula, general manager of the works, presented him with a silver tea service and tray on behalf of his friends and colleagues. Mr. Phipps joined the G.E.C. as a chemist in the Carbon and Battery Works in 1917, and three years later, when the Witton Development Laboratories were built, he became first assistant in the Chemical Department. In 1928 he was transferred to the Witton Moulded Insulation Works to take charge of research, development and production of battery boxes, and was appointed deputy general manager in 1938. Mr. Phipps is well known in the plastics industry and served as chairman of the Midland sub-section of the Moulders' Group of the British Plastics Federation in 1952 and 1953.

Mr. A. E. Phipps receiving a presentation on his retirement from the post of deputy general manager of the Witton Moulded Insulation Works of the G.E.C. Mr. R. J. Kaula, general manager of the works, who made the presentation, is on the right

In addition to the names of electrical men included in the Queen's Birthday Honours List which we reported in our last issue, a knighthood was awarded to **Colonel Stanley Bell,** a director of Oldham & Son, Ltd., and managing director of the Astley Industrial Trust, Ltd.

Colonel Stanley Bell

Mr. S. H. Harding, A.M.I.E.E., senior technical sales and contracts engineer, London area, with Allen West & Co., Ltd., is the national chairman of the Association of Supervising Electrical Engineers for 1954-55.

Mr. N. B. Castleton has been appointed manager of the Cardiff branch of Cryselco, Ltd., as from 1st July. He succeeds Mr. S. Liversage, who has been transferred to the company's Manchester branch.

Mr. N. Matthews, A.M.I.E.E., at present second assistant engineer, No. 1 Sub-Division, North West, Merseyside and North Wales Division, B.E.A., has been appointed deputy station superintendent at Carlisle generating station and takes up his new appointment on 1st August. Mr. Matthews was apprenticed to W. H. Smith & Co., Carlisle, and the Carlisle Corporation Electricity Department, and after service in the R.A.F. from 1940 to 1945, returned to the Carlisle power station where he has since held the successive appointments of control room engineer, boiler house shift charge engineer, plant test engineer and assistant boiler house superintendent.

On 10th June 103 employees of **Pritchett & Gold and E.P.S. Co., Ltd.,** Dagenham Dock, Essex, were presented with cheques for £100 and certificates to mark their completion of over twenty-five years' service. Of the recipients, three have spent more than fifty years in the company's employ; ten have over forty years' service, fifty-one over thirty years, and the remainder between twenty-five

and thirty years. The presentations were made by the chairman of the company, Mr. A. W. Browne, O.B.E., M.I.E.E., accompanied by Mr. H. V. Schofield, M.C., M.I.E.E., director. In presenting a cheque and certificate to **Mr. E. Honey,** general manager, with twenty-six years' service, Mr. Browne announced the board's decision to make Mr. Honey a director.

Mr. R. Seligman, of Scope Laboratories, North Essendon, Victoria, arrived in this country this week to introduce a soldering iron which his firm has developed. His address is c/o Commonwealth Trading Bank, Australia House, London, W.C.2.

Mr. David C. Patton, chairman of the Sangamo Co., Ltd., electrical equipment manufacturers, Toronto, is visiting Europe. He arrived at Southampton last Friday.

At the meeting of the Council of the Public Transport Association held on 10th June, **Mr. E. L. Taylor** was re-elected chairman for a second year of office. **Mr. S. Dudman** and **Mr. J. W. Womar** retired from the offices of vice-chairmen and have been succeeded by **Mr. J. M. Birch** and **Mr. T. R. Williams.**

A Mechanical Handling Exhibition luncheon arranged by **Chloride Batteries, Ltd.,** was held on 11th June at the Clarendon Restaurant, Hammersmith, and was attended by directors and sales managers of nearly every manufacturer of electric industrial trucks in Great Britain. The gathering was addressed by Mr. A. W. Browne, chairman of the company, and Mr. R. Ransome (Ransomes, Sims & Jefferies, Ltd.).

At the **British Electrical Power Convention** dance and cabaret on 17th June, the results of the B.E.P.C. Golf Competition were announced by Mr. W. J. Bird, the hon. secretary. The "G. P. Dennis" trophy and the personal replica given by Mr. John Dennis, were presented by Mrs. J. R. Beard to Sir Henry Self (deputy chairman (administration), B.E.A.), who returned a score of 38 points in the Stableford Competition off a handicap of 12. The runner-up trophy was presented to Mr. W. McL. Wishart (accountant, Yorkshire Division B.E.A.), who also returned a score of 38 points off 12 handicap, but who scored one point less than Sir Henry on the second nine holes.

The "Lady Citrine" rose bowl (ladies' medal round competition) was presented by Lady Citrine herself to Mrs. L. H. Welch (wife of the chief engineer of the London Electricity Board) who returned a score of 76 net off a handicap of 12.

After the presentation of prizes, Mr. W. J. Bird expressed his thanks to Mrs. E. B. Sawyer for her assistance in running the ladies' competition, and to his colleague, Mr. C. F. Boyes.

As we have announced, the proceeds of the golf competition are going to the Electrical Industries Benevolent Association. Apart from this the Association benefits by £137 from the sale of flags and other money-raising methods employed during the Convention by the Sussex Centre (hon. secretary, Mr. T. H. Batchelor).

Mr. K. Short, D.L.C. (Hons.), A.M.I.E.E., previously chief engineer to Truvox, Ltd., has been appointed technical director of the company. Mr. Short studied at Loughborough College for five years and joined Truvox, Ltd., during the latter part of the war, working on special wartime productions. He left Truvox in 1948 and returned to college for one year, rejoining the company at the end of 1949. He became chief engineer at the end of 1950.

Mr. K. Short

Mr. R. E. Prickett, secretary of the South Eastern Area of the **Electrical Industries National Golf Championship,** informs us that it has been necessary to alter the date and venue of the area final. This will now be held at the East Brighton Golf Club on 23rd July and not at the Royal Eastbourne on 9th July as previously stated. Due to the alteration in date, there is now additional time in which to submit score cards and these can be obtained from Mr. Prickett, at 59a, Middle Street, Brighton.

Mr. C. A. Patterson has joined the technical sales department of Smart & Brown (Engineers), Ltd., as a lighting engineer. Mr. Patterson was previously with the Benjamin Electric, Ltd.

Mr. C. A. Patterson

Submarine Cables, Ltd., owned jointly by Siemens Bros. & Co., Ltd., and the Telegraph Construction & Maintenance Co., Ltd., held its annual luncheon party at Claridges, London, last Friday. Mr. J. N. Dean, chairman and managing director, presided. In proposing the toast to the company, Earl De La Warr, the Postmaster General, spoke of the problems involved in the manufacture and laying of the new Atlantic telephone cable, and said that the company, which was undertaking the major part of the project, was fitting out a new factory at Erith, Kent, for the purpose. In addition, a part of the bed of the Thames would be moved from Erith to Ramsgate so that H.M.T.S. "Monarch," the largest cable-laying ship in the world, could berth alongside to load the cable. The Atlantic cable would be 2,000 miles long and involve the use of 52 repeaters, many of them two miles below the surface of the ocean. The repeaters would contain more than 300 valves and about 6,000 other components.

June was at its best for the annual sports meeting and gala of the London establishments of the **General Electric Co., Ltd.,** held on Saturday last at the company's sports ground, Preston Road, Wembley, and the summer weather brought a large gathering of relatives and friends to watch the keenly contested forty or more events for the many challenge cups and a wide range of prizes. The "Leslie Gamage" trophy for the leading London establishment was won for the sixth year in succession by head office. In addition to the racing events, there was an excellent assortment of sideshows which did good business. A children's playground was well patronized, and the kiddies had their own races. The directorate of the company attended in full force and included Sir Harry and Lady Railing and Mr. Leslie C. Gamage and the Hon. Mrs. Gamage. At the conclusion of the events the Hon. Mrs. Gamage distributed the prizes. An enjoyable day concluded with a dance in Hirst Hall.

OBITUARY

Mr. W. Hoult.—The death occurred on 17th June of Mr. Wilfred Hoult, M.Eng., B.Sc., M.I.E.E., formerly a director of the Mid-Cheshire Electricity Supply Co., Ltd., Northwich. Earlier, Mr. Hoult was associated with Imperial Chemical Industries, Ltd., and Siemens Brothers & Co., Ltd.

Mr. C. H. Armstrong.—The death occurred on 16th June of Mr. Clifford Harry Armstrong, M.Inst.Fuel, managing director of Copes Regulators, Ltd., with which company he had been associated since its formation in 1928. He was sixty-three.

Mr. Ernest O. Pollak, sales manager of Smart & Brown (Engineers), Ltd., died on 12th June at the age of fifty-one. Mr. Pollak was born in South Africa and before the war was sales manager of British Electric Domestic Appliances, Ltd. Later he became Midlands area representative for Ferguson Radio and in the immediate post-war years served in the Atlas Lighting Division of Thorn Electrical Industries, Ltd., subsequently joining Drubel Radio Distributors of Croydon. In 1952 he was appointed sales manager of Smart & Brown (Engineers), Ltd.

Mr. J. W. Turner, district representative of the D.P. Battery Co., Ltd., has died. He joined the company in 1917.

Mr. W. H. Charlesworth.—The death occurred on 18th June of Mr. William Henry Charlesworth, chief electrical engineer, Olive & Parkington, Ltd., Turn Lee Mills, Glossop.

Mining Electrical Engineers

Association's Forty-Sixth Annual Convention in Glasgow

THE annual convention of the Association of Mining Electrical and Mechanical Engineers opened in Glasgow on 15th June with an informal reception of some 650 members and guests. Next morning visits were paid to one or other of the following works, where the chief items of interest for the members were as indicated: M. & C. Switchgear (flameproof and industrial switch and control gear up to 3,000 V); John Brown & Co. (gas, steam and water turbines, diesel engines and gearing); Martin, Black & Co. (production of wire ropes); Fullerton, Hodgart & Barclay (electric winders and air compressors); and Scottish Cables (paper, rubber and plastic insulated cables, and wire drawing).

Wednesday afternoon was occupied by the annual general meeting and the presidential address by Mr. B. L. Metcalf. At the former, Mr. J. Vaughan Harries, the retiring president, was in the chair and Messrs. A. B. Muirhead, F. Beckett (hon. treasurer) and Williams presented reports on various aspects of the Association's activities. Mr. Henderson, dealing with training and education, emphasized the need for support of the recently introduced City and Guilds appropriate examination, and drew attention to the work of the Certification Committee, now nearing completion, and to the importance to members of the Ministry of Fuel and Power's Safety Circulars 210 and 212. The Association's Gold Medal was awarded to Messrs. D. W. Powell and H. Williams for their paper on "Some Experience in the Dynamic Braking of Winders." These authors also received the first award in Grade 1, second place going to Mr. G. W. Eaton for his paper on "Area Power Availability, with Special Reference to a Proposed Pit-head Generating Station," and third place to Mr. W. Jamieson for his contribution on "Choosing a Colliery Motor." In Grade 2, Mr. H. M. Hughes received first prize, and in the Student Class, Mr. B. S. Crabtree.

Mr. Harries reported on the efforts made to secure adjustments to the Mines and Quarries Bill for improving safety and put a resolution for submission to the Government, which was carried unanimously. This resolution was as follows: "Whilst the Association recognizes without qualification the over-riding authority of the colliery manager, it desires to express its profound dissatisfaction with the attitude of the Minister of Fuel and Power to its request that Clause 13 of the Mines and Quarries Bill should be amended to require that the colliery electrical engineer and the mechanical engineer should be appointed by the owner and not by the manager."

In his presidential address Mr. Metcalf (chief engineer, National Coal Board) discussed the effects on the membership of the new articles of association (which admitted those classed as mechanics and electricians) and of the General Regulations, 1954 (published in draft form). He also dealt in detail with the qualifications and training required by professional engineers and technicians, as defined by the Institution of Electrical Engineers but adapted to include those specializing in the mining and mechanical branches also, in relation to the award of National Certificates in mining. More use would be made of works-based sandwich courses, leading to a diploma in engineering, of equal six-monthly periods in college and industry. The president deprecated the view that there should be one training course only for the three branches, since infiltration of new blood from other industries was desirable. The training of technicians called for a working knowledge of theory and quantities; basic manufacturing, installation and operational processes and techniques; regulations; and supervision of craftsmen.

In mining the Ordinary National Certificate was divided into four groups, viz. mining, surveying, mechanical and electrical. The last two were still administered by the appropriate senior Institutions, so that a man who had taken an O.N.C. in mining electrical engineering, for example, was not so well qualified as one who had taken the O.N.C. in electrical engineering, but the H.N.C. was equivalent in education to that taken by men in any other industry.

Craftsmen's training was not considered in detail, but reference was made to the launching by the N.C.B. last year of what was perhaps the most comprehensive apprenticeship scheme undertaken by any industry. Mr. Metcalf entered a plea for more training to be given to colliers in the use of machinery and the serious consequences of its misuse.

As a guide to the potential membership of the Association he gave the number of those eligible (in 1952) for membership, apart from professional engineers, as: mechanics, 3,608 under 21 years of age and 15,446 of 21 years and over; and electricians, 3,089 and 8,533. Corresponding figures for other tradesmen were 1,243 and 16,508.

The day concluded with a civic reception by the Lord Provost of Glasgow.

Thursday morning was allocated to a paper on "Maintenance of Mining Plant" by Mr. A. E. Crook, Principal Inspector of Mechanical Engineering in Mines and Quarries. As a background to his more detailed consideration of the upkeep (mainly mechanical) of the great number of machines and processes involved, Mr. Crook gave particulars of the numbers, horse-power and types of machines and ancillary apparatus that required maintenance both for safety and efficient working.

Since the Association was formed in 1909, he stated, the annual output of deep-mined coal had fallen from 260 million to 212 million tons, the number of mines from 3,000 to 1,334 and the number of wage-earners from 1,500,000 to 713,000. Last year 83 per cent of coal was mechanically cut, compared with 7·7 per cent in 1912; 54 per cent was mechanically cleaned, compared with 28 per cent in 1930. Aggregate horse-power installed was now about 6½ million or nearly 9 h.p. per person employed, but only 2 h.p. of this was at the coal face. At the 840 mines producing 99 per cent of the annual output, there were 164,304 machines with a total horse-power of 6,356,853; these were driven by 107,156 electric motors, 52,543 compressed air and internal combustion engines and 4,605 steam engines. Underground machines accounted for 70·5 per cent of the number and 37·5 per cent of the h.p. The average mine had nearly 200 machines amounting to

Mr. A. E. Crook reading his paper on maintenance of mining plant

7,500 h.p., of which 140 totalling 2,850 h.p. were underground, while a large mine with an annual output of 1 million tons might have 750 machines and 35,000 h.p. About 50 per cent of the underground machines were transportable and could be overhauled in workshops. Much obsolescent plant, costly to maintain, was still in use. Steam engines used nearly 60 million tons of steam a year at an average pressure of 100 lb/sq in, which was raised in 4,000 shell boilers and 500 water-tube boilers by burning over 10 million tons of coal. Electric motors used 4,100 million kWh a year, of which 1,600 was generated by the mines' own plant. Diesel locomotives hauling both mineral and persons varied in weight from 2·4 to 15 tons, in h.p. from 16 to 100 and in maximum speed from 4 to 14·8 m.p.h. Corresponding particulars for battery locomotives were 3·5 to 13·5 tons, 15 to 90 h.p. and 7 to 16 m.p.h. In many mines 10 tons of water was pumped to the surface per ton of coal raised and 600 h.p. motors were in use for driving turbine pumps.

In the discussion which followed Mr. D. M. Wardlaw said that the paper was a very positive justification of the Association's plea for certification but many months and much analysis would be required. The author replied that the draft regulations had been available for some two years.

Mr. H. Watson-Jones agreed that the problems of maintenance were admittedly staggering and that the coal industry lagged far behind others; he cited the electricity supply industry for comparison. The Association, he believed, might influence design and production of plant so as to reduce the necessity for maintenance on the scale now necessary. Freer intercourse between the design staff of manufacturing firms and the maintenance staffs of the Board could minimize the volume of work by improving design. The immediate problem was to find the personnel to carry out the very formidable task of inspection. Mr. D. R. Love outlined an inspection and servicing scheme as applied to hoists in South Africa. The object there was preventive maintenance by inspection of the maintenance work done by the plant staffs. Once a month the hoist was laid off for four hours. Advantages were numerous; stoppages were averted, the standard of maintenance improved, since the plant staff sought to avoid an adverse report, defects were more readily observed, very careful records were kept and analysis of these records allowed the maker's design staff to take action at the design stage. Some 180 winders owned by 30 companies were looked after by eight people under this scheme. Experience had shown that complete withdrawal and overhaul was necessary at definite periods and he suggested that makers could give a lead by indicating the period after which a complete overhaul should be undertaken.

Mr. E. Leynes discussed the possibility of doing a great deal of maintenance in underground shops and of using a unit replacement policy.

Mr. M. V. Kelly considered that one main cause of accidents was the inadequate time allowed for the task; there must also be adequate tools. He advocated instituting a plant index at each colliery.

Mr. N. J. Muschamp raised the question of manufacturing activities at area workshops and suggested that they might confine themselves to overhaul, leaving production to the manufacturer.

Mr. James Anderson stressed the increasing problem of design and production of more and more machines of more powerful types. He assured members that manufacturers did have maintenance very much in mind at the design stage; he gave the personal view that the N.C.B. was right in taking every step to ensure that plant was properly maintained, but emphasized the valuable guidance offered a maker when a machine was returned to the factory. It was only then that the maker saw what really happened to his machines.

Replying briefly, Mr. Crook urged engineers to get the "bare bones" of a programme into operation, to prepare their plant index and to build on that basis. The detailed aspects of safety were not his province. His duty was to state the principles, but he assured engineers that they would find co-operation and understanding. Sympathetic consideration might be given, for instance, to an extension of underground repairing. He agreed completely with Mr. Kelly on the need to start work on a plant index and added that the Association might do much by producing a symposium on maintenance of mining plant, which should be given maximum circulation among the branches.

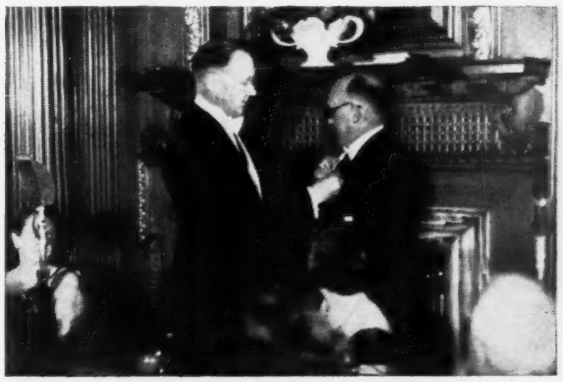
The National Coal Board, Scottish Division, acted as host at a luncheon on the Thursday. Dr. William Reid, who took the chair, said that they were now well on the way to completion of their very great programme of development, and in that work the Association members had played no little part.

Replying, the president said that the tasks of the Scottish Division were perhaps more formidable than those in some other areas and the invitation was evidence of the importance of the Association in the minds of the Scottish Board.

The afternoon was occupied in a steamer trip to the Kyles of Bute in ideal weather.

The sixth W. M. Thornton Lecture was delivered on Friday morning by Sir Harold Roxbee Cox (chief scientist, Ministry of Fuel and Power). (A report of the lecture and discussion will be published in our next issue.)

Subsequently visits were arranged to the following works: Belmos Co. (air-break flameproof switchgear and motor control gear for mining and industrial applications); Anderson, Boyes & Co. (coal cutters and control gear); Mavor & Coulson (coal cutters, conveyors and loaders).



The new president, Mr. B. L. Metcalf, handing to the retiring president, Mr. J. Vaughan Harries, the past-president's badge

The final event of the Convention was the banquet, where those present overflowed into a number of smaller rooms. To meet this situation Pye Scottish Telecommunications, Ltd., staged a closed circuit TV relay system, so that the top table was visible in every room—the first occasion that this has been attempted in Scotland for this purpose. The speeches were lighthearted and witty as befitted the occasion. The "Association" was proposed by Dr. T. J. Honeyman (Director of Glasgow Art Galleries), who stressed that it was possible to be an artist in industry, the artist being simply the worker who put his heart into his work. The president said that Glasgow had a long tradition of bringing together all the various grades of engineering industry. The speakers at the discussions had been excellent, the attendances and discussion equally so. Members were engineers, mechanics and electricians, who provided the backbone for the future growth and expansion of the Association; it was their duty to bring more of these grades into the organization. There was a great future open to them with certification and the new regulations coming into force and they should be ready to meet that prospect.

The president then handed over the past president's badge to Mr. Vaughan Harries. Replying to "The City and Our Guests," Bailie D. M. Wardlaw, the Senior Magistrate, stressed the satisfaction of the city at the presence of the Convention. Tribute was paid to Mr. G. G. Middleton and the Convention Committee and the secretariat, and to the West of Scotland Branch.

INDUSTRIAL NEWS

Notice to Terminate Technical Staff Agreement

IN THE absence of any acceptable progress towards a settlement of the Electrical Power Engineers' Association's claim on behalf of technical staff, six months' notice has been tendered to the British Electricity Authority under Clause 47 of the National Joint Board agreement to terminate that agreement and the salary schedules related to it. Under Clause 46 of the agreement provision is made that any difference relating to the agreement shall be remitted to the Industrial Court or any other agreed tribunal for arbitration and any award made shall be binding on the Electricity Boards, the Association and its members. Termination of the agreement will, at the expiry of the period of notice laid down, terminate Clause 46. It is, of course, possible that during the period of notice discussions may be resumed on a basis more acceptable to the Association and its members.

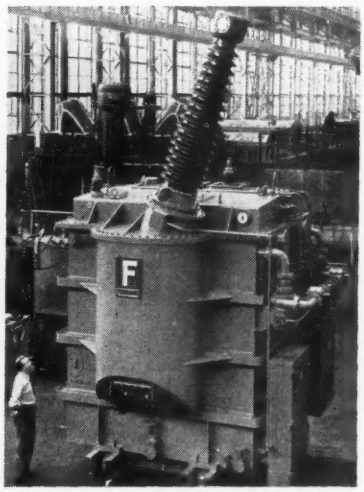
Monopolies Commission's Investigation

An amendment to the Monopolies and Restrictive Practices (Inquiry and Control) Act, 1948, was made last year. The amendment provides, among other things, that the Commission's work may be divided among groups of not fewer than five members selected by the chairman. The chairman has now appointed the following group to continue the investigation and to report on the Commission's reference concerning the supply and export of certain kinds of electrical and allied machinery and plant:—Mr. D. A. S. Cairns, Q.C. (chairman), Sir Thomas Barnes, G.C.B., C.B.E., Mr. J. A. Birch, Mr. W. L. Heywood, O.B.E., Mr. I. C. Hill, Prof. Sir Arnold Plant, Mr. C. E. Wrangham, C.B.E., and Sir Richard Yeabsley, C.B.E.

This investigation has been in progress for some time and the constitution of the group will not involve any duplication of work already done as the members have already been concerned in the investigation.

Transformers for America

On Wednesday last week three 230 kV Ferranti transformers forming the first 100,000 kVA bank for the Garrison Dam Project, North Dakota, U.S.A., was loaded on to the s.s. *Manchester Regiment* at the Manchester Docks. The transformers will be shipped to Montreal and then transported to Riverdale. Ferranti, Ltd., are supplying a total of nine 33,333 kVA, single-phase, 60 c/s 13·2/230 kV generator transformers forming three 100,000 kVA, 3-phase banks, to the U.S. Army Corps of Engineers for installation in the Garrison Dam power plant. The total value of the contract is $880,000. The generating plant includes five 80,000 kW hydro-electric units with a maximum continuous rating of 97,800 kVA each. Generation is at 13·8 kV which will be stepped up for transmission to 115 kV and 230 kV by transformers which are located outdoors at the power plant on a transformer deck built on the downstream side of the power house and over the draft tubes. Three generators will connect to the 230 kV bus, and two to the 115 kV bus. The transformers for the 230 kV busbar which are being supplied by



One of the Ferranti transformers for the Garrison Dam project, U.S.A., in the test laboratory at Avenue Works, Hollinwood

Ferranti, Ltd., are of the oil immersed, inert-gas FOW type fitted with off-load tapping switches. The transformers comply with the NEMA and ASA standards and noise and impulse level tests have been carried out to the requirements of these standards. A nitrogen cushion of the high pressure type is provided. The total weight of each transformer bank is 216 tons and the weight of each transformer when stripped for transport is 51·5 tons.

Fuel and Power Statistics

An important feature of the Ministry of Fuel and Power Statistical Digest for 1953 (H.M. Stationery Office, £1 1s) is the result of the survey of steam and power usage in industry made in the past year. This section provides data from which estimates may be made of the potentialities for the extended use of back pressure or pass-out engines and turbines in the generation of power. It includes the amount of fuel used for steam raising, the use of steam for different purposes, the distribution of the steam load, the type, size and age of the boilers in use and engines installed, the production of mechanical and electrical energy and the amount of electricity purchased.

The survey was limited to the larger establishments using more than 2,000 tons of fuel a year (oil being assumed to be equivalent to twice its weight of coal). There are approximately 4,600 such undertakings with a total fuel consumption of 63 million tons a year. The return was a voluntary one, but 84 per cent of the questionnaires were completed, and although these account for only 12 per cent of all establishments consuming more than 100 tons of fuel a year, they cover 73 per cent of the total fuel consumed. Much of the information given has never before been available.

The Digest, which this year appears several months earlier than previous issues, includes the usual wide range of information relating to the fuel and power industries. New information is also included about the employment of locomotives and the use of power at coal mines.

Trolley-bus Extensions at Bradford

Bradford City Council Finance Estimates Sub-Committee has approved the construction of overhead wiring for the Buttershaw trolley-bus extension at an estimated cost of £9,800.

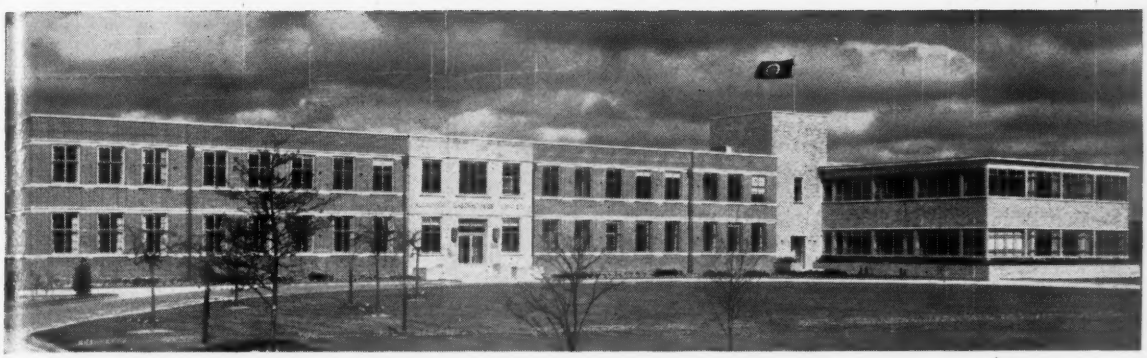
Prices of Materials

In the accompanying table we give the basis prices of the more important materials used in the electrical industry. The figures given are the selling prices and are those quoted on Tuesday last.

ALUMINIUM Ingots	ton £156 0s 0d
COPPER, H.C. Electro	ton £239 10s 0d
Fire Refined 99·70%	ton £238 0s 0d
Fire Refined 99·50%	ton £237 0s 0d
COPPER Tubes ..	lb 2s 3½d
Sheet	ton £299 15s 0d
H.C. wire and strip ..	ton £266 10s 0d
LEAD, English ..	ton £96 10s 0d
Foreign	ton £95 0s 0d
MERCURY	flask £95 0s 0d
TIN, block (English) ..	ton £721 0s 0d
ZINC, G.O.B. Foreign	ton £79 5s 0d
Electrolytic	ton £86 15s 0d
BRASS Tubes (solid drawn)	lb 1s 10½d
Sheet	ton £245 10s 0d
Wire	lb 2s 6½d
PHOSPHOR BRONZE Wire	lb 3s 9½d
PLATINUM	oz £30 0s 0d
RUBBER, No. 1 R.S.S. spot	lb 19½d–19⅝d

Electric Point Operation

In his report to the Minister of Transport on the railway accident at Bethnal Green Station last September Brigadier C. A. Langley, an inspecting



New aluminium research laboratories at Banbury

officer of railways, states that the points which had been set for the passage of the express train along the main line were found lying bolted for the cross-over movement to the suburban line. The integrity of the signal interlocking was established and it was clear that the signalman was in no way to blame. Linemen were testing the point motor circuits at the time of the accident and in Brigadier Langley's opinion the most likely cause of the accident was the slipping of a terminal link during testing, which could easily occur if the lineman was not careful. Some of the equipment used was not entirely suitable. The type of link employed at Bethnal Green was being replaced by a modern design that could not slip and make contact with adjacent terminals.

New Aluminium Laboratories

Aluminium Laboratories, Ltd., the research, engineering and geological exploration unit of Aluminium, Ltd., announce the completion of the new extensions to their research laboratories at Banbury, Oxon. The new facilities, construction of which was begun in 1951, have cost over £300,000. They add a further 44,000 sq ft to the floor area of the older building, and a total area of 65,000 sq ft is now available. The buildings were designed by Sir Percy Thomas & Son.

The Banbury laboratories, which are staffed by almost 200 people, about a quarter of whom are graduates, conduct basic and applied research in the light metal field. They also engage in the investigation of technical problems in the fabricating and sales fields for the benefit of associated companies in the organization.

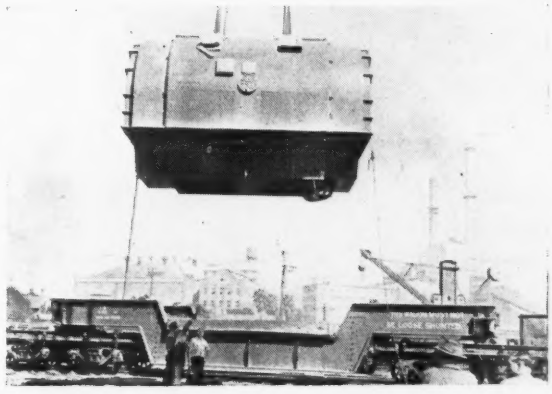
The new premises provide a completely integrated modern laboratory fully equipped for chemical, metallurgical, physical and engineering research. The many facilities available include a laboratory designed for the testing of large prototype aluminium structures for ships, bridges and other purposes. Another laboratory is devoted to research into the use of aluminium for canning. This includes prototype equipment for drawing and lacquering aluminium containers and for testing the behaviour when packed with different products. A model plant for the production of aluminium paste used as a pigment for paint is available for development studies; another large experimental shop houses equipment for service and development work on welding and other joining processes.

Canadian Atomic Reactor

The Ottawa correspondent of *The Times* reports that Mr. C. D. Howe, Canadian Minister of Trade and Commerce, said in the House of Commons on 18th June that a new atomic reactor being built at the Chalk River atomic research station, Ontario, would cost between $35 and $40 million and would be completed early in 1956. It would be a "homogeneous" reactor, producing plutonium and isotopes, and it would be suitable for power production experiments. Studies were also being made for the construction of an atomic power plant the cost of which, it was hoped, would be borne by Canadian power users. The Ontario Hydro-Electric Power Commission was interested in the project.

Tallawarra Power Station

The 30,000 kW stator illustrated is for the second of four B.T.H. turbo-alternators which are on order for the station. Each set has a rating of 35,295 kVA, 0·85 power factor, 50 c/s, 11 kV with a short-circuit ratio of 0·7. The turbines are designed for steam conditions of 600 lb/sq in gauge at 850 deg F total temperature and are two-cylinder, double-flow, impulse-reaction type machine with 22 high-pressure stages and seven double-flow low-pressure stages.



A 30,000 kW stator being loaded on to a rail vehicle at Sydney en route for Tallawarra power station, N.S.W.

Contract Price Formulæ

The British Electrical and Allied Manufacturers' Association has issued the figures for its contract price adjustment formulæ. In each case the rate of pay for adult male labour at 12th June is deemed to be 150s 6d. The "cost of material" figures are:—

For electrical machinery and equipment the Board of Trade index figure published on 12th June is 158·7 (provisional).

For turbo-generating and allied plant: materials used in mechanical engineering industries, 149·3 (provisional), blast furnaces and iron and steel smelting and rolling (40 and 41), 144·0 (provisional), price of ⅜in o/d 18 s.w.g. brass condenser tubes (*Metal Bulletin*, 21st May), 3s 6½d per lb. Outstanding contracts covered by the B.O.T. intermediate products index: the index figure for intermediate products (12th June) is 356·9 (provisional).

Brush Foremen's Conference

The Brush Group's tenth management meeting for foremen was held at the Group's Loughborough works from 11th to 13th June. It was attended by nearly forty foremen from the Group's factories in this country. An address was given at the inaugural dinner by Mr. Ian T. Morrow, deputy managing director, the Brush Group, Ltd. Talks on personnel management in Nigeria were given by Miss B. N. Seear, tutor at the London School of Economics; shop floor problems by

Mr. V. Feather, assistant secretary to the Trades Union Congress; employment and the law by a partner from the company's solicitors; and present day sales problems by Mr. J. P. Ford, managing director of the Group's export companies and chairman of the Council of the Institute of Export. The final session was devoted to a general discussion led by Mr. D. S. A. E. Jessop, the Group personnel director.

B.T.H. Radar Contract

A third contract for mobile fire control radar, Type A.A. No. 3 Mk7, valued at $5,700,000 (£2,020,000) has just been placed with the British Thomson-Houston Co., Ltd., by the U.S. Army European Headquarters Command. This brings the total value of the three orders to over $14,000,000 (£4,975,000). All the equipment is for N.A.T.O. countries. The first two contracts have been completed and delivery of equipment covered by the latest order will begin almost immediately.

The contract for U.S. Army European Headquarters being signed by Mr. E. H. Ball (managing director, B.T.H.). Seated (left to right): Mr. V. M. Roberts (manager B.T.H. Electronics Sales), Mr. E. H. Ball, Col. Paul van Sloun (U.S. Army European Headquarters Command). Standing (left to right): Mr. H. L. Satchell (director, manager, Rugby Works, B.T.H.), Mr. E. A. Buckland (B.T.H. Electronics Sales) and Mr. G. S. C. Lucas (director, chief electrical engineer, B.T.H.)

Copper Development Association

A luncheon was held recently at Kendals Hall, Radlett, to mark the coming-of-age of the Copper Development Association. Lord McGowan said that in more than one field the Association was acknowledged as a leading authority and it acted as watch-dog on behalf of the copper-using industries over a wide range of standardization activities. He made a plea for a closer association of science with industry.

New Winder for Vaal Reefs Mines

The Fraser & Chalmers Engineering works have received a contract from the Anglo-American Corporation of South Africa to supply the mechanical parts for a 10ft dia double drum winder for the Vaal Reefs Exploration & Mining Co., Ltd. The unit is designed to wind 6 short tons at a maximum rope speed of 2,500ft/min. The depth of wind is 3,600ft and the winding cycle is 100 sec. Both winder drums are fitted with clutches and are driven by a single 1,800 h.p. a.c. motor through single reduction gears. The mechanical parts, with the exception of gears and specialized items, will be manufactured in South Africa from drawings and design data supplied by Fraser & Chalmers.

Overseas Electrical Trade

A recovery from £14·1 million in April to £15·3 million last month brought the total exports of electrical machinery and apparatus for the first five months of the year to £74·7 million, thereby again surpassing the corresponding figure for January-June, 1953 (£73·9 million). Last month's total compares with £14·4 million for May, 1953. Imports of electrical machinery and apparatus last month amounted to £1·2 million (against £0·7 million in April), bringing the total for January-May to £6 million (£3·6 million).

Lyons' Electricians Protest

Last Friday electricians employed by J. Lyons & Co., Ltd., who were called out on strike about two months ago by the Electrical Trades Union, demonstrated against a Union official, demanding that a mass meeting should be called to discuss resumption of work. A meeting was promised for this week. The strike arose out of the refusal of a supervisor to join the Union of which he was formerly a member.

Industrial Art Bursaries

The Royal Society of Arts has issued a booklet giving particulars of the offer of prizes, amounting to £2,500, in this year's Industrial Art Bursaries Competition. The prizes take the form of travelling bursaries, usually of £150 each, and are open to students who intend to take up industrial designing as a career. The closing date for entries is 11th October. An illustrated report on last year's competition is included in the booklet.

Royal Commercial Travellers' Schools

At the yearly court of governors of the Royal Commercial Travellers' Schools at Hatch End held last Friday, the president of the schools, Mr. Leslie Gamage, M.C., M.A., F.C.I.S., of the General Electric Co., Ltd., said that the main problem of the Board was the endeavour to meet additional expenditure caused by rising prices and wage and salary "awards" over which the Board had no control.

Junior Institution of Engineers

The Junior Institution of Engineers has moved to 14, Rochester Row, Westminster, S.W.1 (telephone: Victoria 0786).

Annual Holidays

The works and offices of Higgs Motors, Ltd., will be closed from 23rd July until 9th August.

The works of the Jackson Electric Stove Co., Ltd., Luton, will be closed from 17th July until 2nd August inclusive.

The offices and works of the Sturdy Electric Co., Ltd., will be closed from 31st July to 16th August.

Trade Announcements

Thermodare (Great Britain) has appointed Mr. D. W. Lee, 56, Hobleythick Lane, Westcliff-on-Sea, as its representative in the Eastern Counties.

Ekco - Ensign Electric, Ltd., has appointed Mr. C. H. Dunkley as its representative covering the London postal districts of W.1 and W.C.1. He will operate from the company's southern sales office at 45, Essex Street, Strand, London, W.C.2.

The London office of **Permali, Ltd.,** is now at Windsor House, 46, Victoria Street, S.W.1. The telephone number is unchanged.

Catalogues and Lists

Edward Pryor & Son, Ltd., Broom Street, Sheffield.—Illustrated folder dealing with "EP" automatic numbering heads (55).

Normand Electrical Co., Ltd., North Street, Chapham Common, S.W.4.—Catalogue of the company's recently introduced range of flameproof motors and geared motors (541).

Bulpitt & Sons, Ltd., St. George's Works, Icknield Street, Birmingham, 19.—Illustrated priced catalogue of "Swan Brand" electrical appliances and ground base holloware (76).

J. W. Hughes, 3, St. Thomas' Street, London Bridge, S.E.1.—Priced list of time switches, poultry switches, etc.

Associated British Oil Engines (Marine), Ltd., Wellington Works, Ashton-under-Lyne. — Technical publication dealing with "National" oil operated reverse reduction marine gearboxes (M1602).

Ideal Machine Tool & Engineering Co., Ltd., 282, Kingsland Road, London, E.8.—Illustrated leaflet on plastic oil containers and hand oilers.

Airmec, Ltd., High Wycombe, Buck.—Two technical leaflets dealing with the company's new industrial electronic counter, type N851, and batch counter, type N808.

Funditor, Ltd., Woodbridge House, 3, Woodbridge Street, E.C.1.—Leaflet giving details of the company's hydraulic flywheel graduating machine.

THE PARSONS CENTENARY

Exhibition of Original Inventions and Later Developments

Sir Charles Parsons (1854–1931)

AN exhibition to mark the 100th anniversary of the birth of Sir Charles Algernon Parsons was opened at King's College, Newcastle-on-Tyne, on 14th June. Arranged by the College Department of Mechanical Engineering, the exhibition displayed a number of models made by Parsons and also models of up-to-date land turbines, marine turbines, axial-flow compressors, gas turbines, astronomical instruments and glass reflectors. Lord Ridley, chairman of the Council of King's College, presided at the ceremony, and among the many guests present were Miss Rachel Parsons, daughter of Sir Charles, and Mr. Geoffrey Parsons, a nephew. Lord Ridley mentioned that Sir Charles had been a member of the College Council for many years.

Alderman R. Mould-Graham, Lord Mayor of Newcastle-on-Tyne, opening the exhibition, said it was a fitting tribute to Parsons. Although Sir Charles had not been born at Newcastle he had carried out the work there which had made him famous and his name would always be associated with Newcastle. In 1914 Sir Charles was made a Freeman of Newcastle, the highest honour which could be bestowed on a citizen. From 1920 until his death in 1931 he had also served on the City Council.

Sir Claude D. Gibb, chairman, C. A. Parsons & Co., Ltd., mentioned that that company and the associated Parsons Marine Steam Turbine Co. supported about 12,000 families through direct and indirect employment. This had been brought about by the embryo ideas of a brilliant thinker.

Following the opening, Professor Aubrey Burstall, president of the Stephenson Engineering Society, delivered an address on " The Place of Sir Charles Parsons in the History of Mechanical Engineering."

In his address Professor Burstall said that the building of the first successful steam turbine by Parsons in 1884 opened a new era in which unprecedented benefits in the shortest time had come from mechanical ingenuity. Perspective was given to the subject by an account of previous proposals for the construction of steam turbines and by an outline of earlier achievements in power production. These periods could be divided into three, he pointed out. The first reached its climax in the 17th century with the foundation of experimental science based upon mathematics and exact measurement, particularly of time. The outstanding inventor of that age was Leonardo da Vinci (1452–1519). The second phase (coal and iron) began after 1700 A.D. to continue until about 1870–1900 with James Watt (1736–1819) as the predominant figure.

What Parsons achieved as the greatest mechanical engineer of the present era was the production of a prime mover of large output and reasonable thermal efficiency, which occupied a relatively small space for its power and provided a uniform torque and virtually eliminated vibration. Moderate surface velocities and speeds of rotation were obtained by splitting the fall in steam pressure into small fractional expansions over a large number of turbines in series. This principle of compounding produced a high efficiency because the steam flowed in an almost non-expansive manner through each individual turbine. The most radical change was effected by the combination of the turbine with the alternator. Parsons also had a share in the improvement of the electric transformer.

Though Parsons was one of the last of the great individual inventors, he was among the first of scientifically trained men to lead a team in the application of science to industry. Problems solved by Parsons included the following, which called for the development of new workshop techniques: the development of the most efficient form of blading; forced lubrication of turbine main bearings; suitable and

The Lord Mayor opening the Parsons centenary exhibition. On his right is Dr. C. I. C. Bosanquet, Rector of King's College, and on his left Lord Ridley, Miss Rachel Parsons and Sir Claude Gibb, chairman and managing director of C. A. Parsons & Co., Ltd.

safe mounting for the high-speed rotor; making helical gearing of unprecedented size and accuracy; erosion and corrosion in the machine; avoidance of cracking of large metal castings and minimizing distortion, leakage and loss of clearances; governing devices; and the vacuum augmenter for the condenser.

Examples of other activities were the production of parabolic reflectors for searchlights, optical glass, the building of large telescopes, experiments on cavitation, flight, and the auxetophone. Altogether Parsons was responsible for over 300 inventions, all of which showed unusual skill as a mechanic in support of his fundamental engineering and mathematical knowledge and apparently some kind of intuitive mental process in determining details of design. Parsons continued to improve his steam turbine until the end of his life, as illustrated by the decrease in steam consumption within a few years, much of which was due to the use of higher vacua in the condenser and higher stop-valve steam conditions. The 7·5 kW unit of 1884 took 129 lb/kWh, the 1,250 kW of 1900 required 18·22 lb/kWh, whereas the 50,000 kW set of 1923 took only 8·19 lb/kW.

While the engineering problems presented by the development of the steam turbine could hardly have been solved without the intelligent application of mathematics of a fairly high standard, it was questionable whether the present university standard was not set too high in the hope that another Parsons might be found among engineering students. The lecturer looked forward to the time when the study of advanced mathematics would be restricted to the few who could demonstrate their mastery of its mysteries and when the great majority would be trained in some other mental discipline which they could understand and develop in themselves.

TELEVISION ACROSS THE ALPS

IN the recently inaugurated European television network, the micro-wave radio link spanning the Alps represents an outstanding technical achievement. This link, 125 miles long, runs from Chasseral in northern Switzerland, through a relay station situated high up the 15,000ft Jungfrau, to Monte Generoso in Southern Switzerland, and it is the only connection between the Italian and German television networks.

The equipment used was supplied throughout by the General Electric Co., Ltd. The order was placed in January by the Swiss firm, Hasler S.A., acting on behalf of the Swiss Post Telegraph and Telephone Administration, and the equipment was installed jointly by the G.E.C. and Hasler S.A. in time for the preliminary " Eurovision " tests at the end of May.

One of the aerials on the 15,000ft high Jungfrau

For the extension of the television network in Switzerland, Hasler S.A. has received an additional order for identical equipment to provide a radio link between Uetliberg, Chasseral, Romont and Dol, and the equipment for this project will be made by Hasler S.A. on behalf of the G.E.C.

The link provides a one-way reversible television channel handling television signals with a bandwidth extending to 5·5 Mc/s so that it is suitable for 625 line pictures. It comprises a terminal transmitter and receiver at Chasseral, a relay station on the Jungfraujoch, and a terminal transmitter and receiver at Monte Generoso. The relay station situated 12,000ft above sea level on the Jungfraujoch is 60 miles from Chasseral and 65 miles from Monte Generoso. The stations are so high that towers are not required.

The system is frequency modulated and operates in the 1,700–2,300 Mc/s band, the two frequencies used in this instance being 1,776 Mc/s and 1,848 Mc/s. Two frequencies are necessary because reception and transmission at the relay station have to take place on different frequencies in order to prevent feedback from the transmitter to the receiver.

The link, which is a permanent installation, has been designed so that it requires the minimum of maintenance. For example, all valves are run under conditions that ensure maximum life; long-life triode valves are used throughout the ultra high frequency stages; the insulating materials employed will withstand wide extremes of temperature and humidity; and the highest voltage used is 300 V d.c. Paraboloid reflectors, 12ft in diameter and spun from aluminium by Precision Metal Spinnings, Ltd., are used throughout.

NEXT WEEK'S EVENTS

The principal event next week is the summer meeting of the Institution of Electrical Engineers, which will be held in the Western Centre from Monday to Friday next. The Southern Centre of the I.E.E. is holding its annual golf competition at Stoneham on Tuesday. Students' Sections of the Institution are holding a summer meeting in Northern Ireland from Monday to Saturday, while the London Students' Section has arranged a summer outing to Oxford on Saturday (3rd July).

On Thursday next the London and Home Counties Branch of the Institute of Physics is holding a meeting at the Royal Institution, Albemarle Street, W.1 (6 p.m.), when Dr. Karl Darrow will speak on " Some Current Work at the Bell Telephone Laboratories."

VIEWS on the NEWS

By REFLECTOR

THERE seems something doubly apt to the occasion in the choice of Professor Aubrey Burstall to deliver an address on the work of Parsons during the celebration of the hundredth anniversary of the birth of the latter. In the first place an ancestor, Timothy Burstall, took out a patent in 1838 in connection with a steam turbine of the Hero reaction type, which was notable for a proposal that a set of arms curving in the opposite direction to the main ones should be mounted on the same shaft for the purpose of reversing the direction of rotation. Secondly, Professor Burstall is president of the Stephenson Engineering Society, and Timothy Burstall was responsible for the steam locomotive "Perseverance" which in 1829 competed unsuccessfully with Stephenson's "Rocket" in the Rainhill trials.

* * *

The E.L.M.A. Lighting Service Bureau can always be relied upon for a spectacular display and once again it did very well in the demonstration arrangements made in connection with Mr. W. J. Jones's Power Convention paper. I particularly liked the domestic interior (complete with hostess in a coloured frock) in which the effects of tungsten, fluorescent and combined lighting were seen to advantage. There were several other ingenious devices including the use of "black light" on fluorescent diagrams which Mr. Jones employed to illustrate his paper. Among other things Mr. Jones proved by visual means that it is a fallacy to believe that black objects are best viewed against a light background. The patterns of black braid and rope were much more clearly defined when they were set in a dark surrounding.

* * *

A plea was made at the Convention for an arrangement by which the housewife could buy fittings all ready to plug into position in her home. Mr. Jones said that such a facility was already extensively available in the United States, even for small homes. There is nothing new in the idea so far as this country is concerned either. In a number of lighting fitting showrooms I have seen ceilings provided with "outlets" into which fittings can be simply inserted, so that frequent changes can easily be made. It should not be difficult to adapt this method to the domestic establishment.

* * *

To emphasize the almost negligible cost of electric lighting, two rather expensive alternatives were mentioned by speakers at the Power Convention. Mr. W. J. Jones has calculated (or should it be estimated?) that to secure from glow worms illumination equivalent to 1,200 lumens 15,000 of these females of the beetle *Lampyris noctiluca* would be required and each would need a snail per day to keep her glowing. The other example was recounted by Mr. S. F. Steward. A consumer had told the Board that electricity was too expensive and she would be forced to revert to candles. The district manager obtained some candles and after careful tests found that to secure the light equivalent of one kWh it was necessary to spend 20s on candles. The result was reported to the consumer who, I suppose, was staggered and convinced.

* * *

One of the electric vehicle items at the Convention Exhibition at Eastbourne was designed to attract particular attention. It was a small van bearing the inscription "North Thames Gas Board." The gas industry relies quite considerably for its efficient operation upon electrical equipment and this was merely another example. I was told rather ruefully by the man in charge of the exhibit that the Gas Boards were better customers for his firm's vehicles than the Electricity Boards. Much as I would like to regard this as impossible I cannot help thinking that it may be true.

* * *

Without, I hope, appearing to be ungallant, I feel that I must voice a widely-expressed opinion about the feminine forum which followed the presentation of Dame Caroline Haslett's paper at Eastbourne. In the first place it was not a good substitute for a straightforward discussion of the paper and in the second place it virtually prevented the discussion of Mr. W. J. Jones's interesting contribution on modern lighting. Although it was a "scripted" question-and-answer arrangement it was in effect a series of lecturettes which would have been much more appropriate at an E.A.W. meeting than at the Power Convention.

* * *

A great deal of discussion at any conference revolves around the hotel accommodation. Sometimes there is a general feeling among delegates that they are being held to continual ransom by the hotels at which they are staying and complaints of bad service are frequent. At Eastbourne, however, there seemed to be more satisfaction than usual and the headquarters hotel (the "Grand") particularly seemed to have been appreciated by those who stayed there.

* * *

Two pages of the *Electrical Review* of 22nd June, 1894 (sixty years ago) were devoted to a report of a dinner organized by Sir David Salomans and the directors of the City of London Electric Lighting Co. at the Cannon Street Hotel at which everything "from the sublime turtle soup to the ridiculous *petite pois* had been cooked by electricity." The equipment, mostly supplied by Crompton & Co., comprised five or six electric ovens, hot plates, electric saucepans, electric fish kettles "and other culinary necessities, all working by electricity." Although this had been claimed to be the first dinner of its kind, the *Electrical Review* referred to an electrically-cooked dinner which had been arranged by the Franklin Experimental Club in New York some weeks before. An additional refinement on this occasion was that "the guests were served with the various courses by a little electric railway." Moreover:

> "At the end of the dinner a rain of flowers covered the table. These flowers, attached to iron wires, had been held suspended during the dinner by electromagnets, and it was only necessary to break the circuit in order to bring them down."

A.M.E.E. Meeting

The platform at the A.M.E.E. Eastbourne meeting

FOLLOWING the pre-vesting practice of the municipal chief engineers of having the annual general meeting of their association during the same week as the I.M.E.A. Convention, the Association of Managerial Electrical Executive held their annual meeting on 15th June at Eastbourne. It was well attended, by members representing managerial staffs from all parts of the country. Mr. A. Kelso, president, who was in the chair, supported by the past-president, Mr. G. J. Moody and the vice-president, Mr. E. J. Turner, submitted the annual report for 1953–54.

Arising from the paragraphs dealing with salary scale negotiations, Mr. Kelso explained that although the general level of salaries for managerial grades had been agreed on the National Joint Committee, there were some positions in a few Area Boards and Divisions which were still the subject of negotiations. Disappointment had been expressed at the time taken in reaching a final settlement, but it had to be remembered that owing to organizational differences between Boards the problem of allocating appropriate grades to posts was not easy to solve. Members affected, however, were safeguarded by the fact that the scales would be operative from 1st April, 1952.

Proposals for Sub-Area managers and chief generation engineers submitted by the Boards had been regarded by the staff side as inadequate, and joint discussions were proceeding. The president emphasized that during the negotiations on the salary scales it had not been possible to examine every position in detail and that the settlement on general levels had been subject to the understanding that every member, if dissatisfied, had the right to appeal through his association to the National Committee. The new salary structure was to be reviewed after 1st January, 1955, in the light of experience gained in the meantime.

In reply to a question regarding the amalgamation of the North Western and Merseyside and North Wales Divisions, the president stated that the staff associations had protested vigorously to the B.E.A. on its failure to consult with them before filling the senior posts. Had the B.E.A. taken the Trade Unions more into their confidence a good deal of disquiet among the staffs might have been avoided.

The hon. treasurer, Mr. H. G. Penniket, in submitting the statement of accounts and balance sheet, drew attention to the improvement in the Association's financial position, notwithstanding additional expenses resulting from enlarged activities. The membership had been well maintained.

A vote of thanks to the retiring president was moved by Mr. Turner, who said that a good deal of the credit for the outcome of the salary negotiations was due to him. After being seconded by Mr. Richardson, the vote was carried with acclamation. In responding, Mr. Kelso referred to the help he had received from Mr. Moody, the past-president, the vice-president, the hon. treasurer, the secretary (Mr. J. W. Thomas), the assistant secretary (Mr. C. R. Sonnex), the executive and the centre officials. He then introduced Mr. Turner as his successor for the ensuing year, who expressed his thanks.

Production Exhibition and Conference

The first Production Exhibition in this country will be held in the National Hall, Olympia, London, from 7th to 14th July. Sponsored by the Institution of Production Engineers, many prominent organizations are exhibiting. The British Productivity Council's exhibit will introduce the theme of the exhibition—" Production for Plenty." A section of the exhibition will be devoted to research and development and will include a large-scale exhibit by the Department of Scientific and Industrial Research; the British Standards Institution will illustrate the importance of standardization, simplification and safety, and there will be other exhibits by industrial research associations. Government Departments will also have displays. On one side of the National Hall, devoted to methods and processes, there will be displays of production engineering research, industrial finishing, precision casting, instrumentation, weighing and measuring equipment, induction heating, refrigeration as applied to industry, and other processes. On the other side supplementary services will be prominent—such as electrical developments, transport, lubrication, scientific instruments, high-speed cinematography, the X-ray examination of metals, developments in production related to basic materials and metals, and aids to production such as lighting and colour in the factory. The exhibition will be opened by Mr. Peter Thorneycroft.

Manufacturers are invited to organize works visits to the exhibition. Concession tickets at 8s per dozen, are obtainable from the organizers, Andry Montgomery, Ltd., 11, Avenue Chambers, 4, Vernon Place, London, W.C.2.

In conjunction with the exhibition a Production Conference is being held. At the opening session Sir Walter Puckey, president of the Institution of Production Engineers, will preside, and the Earl of Halsbury, managing director of the National Research Development Corporation, will present the 1954 Sir Alfred Herbert paper. The other sessions will include " Scientific Research and the Changing Pattern of British Industry," at which Mr. H. Sutton, Ministry of Supply, will speak on " Materials for Gas Turbines," and Mr. W. A. Sales, Director of Aircraft Production and Development, Ministry of Supply, on " The Gas Turbine and the Production Engineer." At the session dealing with " Standards for Export," Mr D. Maxwell Buist, export director, B.E.A.M.A., will speak on " Standards in the Electrical Exporting Industries," and Mr. H. A. R. Binney, director, B.S.I., on " Work of the British Standards Institution as Affecting Export Trade." Tickets (1s 6d for each session) which include pre-print and admission ticket to the exhibition, can be obtained from the secretary of the Institution of Production Engineers, 10, Chesterfield Street, London, W.1.

LETTERS TO THE EDITOR

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.

Electric Shock

I HAVE had correspondence recently with Mr. H. W. Swann, the former H.M. Senior Electrical Inspector of Factories, about his article in your issue for 14th May on electric shock. I have made a close study in past years of the causes, both physiological and electrical, of electric shock and have referred Mr. Swann to my paper in the *Students' Quarterly Journal* of the Institution of Electrical Engineers for March, 1951. In consequence, Mr. Swann suggested I might write to you about this subject and that you might consider my own views on fibrillation.

In electric shock the type of fibrillation which is fatal is that of the ventricles or, if the auricles are involved also, total fibrillation. Auricular fibrillation alone need not be fatal. When fibrillation occurs after some extra stimulus to the heart—electrical, chemical or mechanical—the chamber involved goes into rapid but unco-ordinated activity. The electrical signals from the heart actually *increase* on a cardiograph but no pumping occurs. The cardiograph gives, therefore, a reliable indication of this condition when a stethoscope gives no sound at all.

This condition may be put right by halting all heart activity for a short time, which can be done by "freezing" the heart with a counter-shock. This needs one or two amperes for, say, 0·2 second passed through the heart musculature, which is equivalent to about 20 A fed through the chest of the person. This needs elaborate equipment and skilled operators and is not practicable for first aid. A suggestion I made in my paper was the use of an automatic syringe containing a drug similar to "Coramine." This has no ill effects even if fibrillation has not occurred.

In conclusion I would like to thank you for bringing the need for greater awareness of electrical dangers before the public of this country.

Derby. T. J. WYNN,
Electrical Engineering Department,
Derby Technical College.

Domestic Heating

I WAS very interested in the article on domestic heating by Mr. A. C. Hazel (*Electrical Review*, 11th June, page 1109) and would like to congratulate him on bringing out the point so well that we, in this country, do not know the value of real warmth and comfort and that electricity should be given consideration as a means of background heating as well as for "topping up." He is absolutely correct in his statement that insufficient attention is at present being given to this application of electric heating.

It is a pity that Mr. Hazel seems anxious to avoid argument regarding cost, when surely if we substitute the word discussion for argument this is one of the main points which we are all interested in and, in my opinion, data on actual running costs are (in spite of experiments which have been carried out by various bodies) very difficult to come by and are therefore all the more welcome when included in any article on heating.

Mr. Hazel categorically states that "solid fuel is invariably cheaper than gas, and gas is invariably cheaper than electricity." We all know that the fuel to fuel costs are in the order stated, but when operating efficiency is taken into consideration a very different picture often results.

Taking the case of domestic hot water supply for a small household with intermittent demand, a solid fuel installation can actually cost more for fuel than an electrical system, simply because the operating efficiency of the former can be as low as 6 per cent and the latter may be as high as 90 per cent. I think that, in making his point on the use of electricity for background heating, Mr. Hazel has neglected low temperature panel heating for either walls, floors or ceilings, or a combination of these means.

To give a concrete example, I have a small cottage in London where the living area is 1,000 sq ft, the volume being about 9,000 cu ft. It is heated by means of "Dulrae" ceiling panels with the insulation so arranged that some of the heat from the downstairs ceilings is allowed to come through the floor, but every effort has been made to prevent the heat from the ceilings of the upper floor spreading into the roof space. Each room is separately thermostatically controlled and the average setting is 60 deg F. "Topping up" in the lounge and bedrooms is done by Ferranti inset fires. The total loading is 9 kW in panel heating, and 4½ kW in electric fires. The heating panels are switched on at 7 a.m. and are switched off at 10 p.m. The hot water is provided by a 60 gal "Sadia" unit loaded to 5 kW and approximately 50 gallons at 140 deg F is used per day. The electrical energy is purchased at the standard rate of 1d per unit plus standing charge based on floor area. The amounts paid to the Electricity Board for the December and March quarters were £19 11s 6d and £31 3s 8d respectively, which included electric lighting, refrigeration and a certain amount of small power for workshop, domestic appliances, etc.

I have had considerable experience of the cost of other forms of heating and domestic hot water supplies for small houses and I categorically state that when all relevant factors are taken into consideration, such as available floor area for a given external dimension, capital cost, freedom of spoilage of decorations by fume and dust, saving the labour of stoking and cost of maintenance, electricity is not only the best but is the cheapest means of providing heating and domestic hot water for a small house. As one progresses through size, I agree that there is a case for gas, and quite soon a point is reached where solid fuel or oil win on a question of overall cost, but not for the small house.

London, S.W.7. G. H. BUCKLE.

Electrical Films

IN order to save any further confusion on screen sizes I think it desirable to detail the standard sizes manufactured by R. F. Hunter, Ltd., who produce the "Celfix" series.

	Overall size	Projection size
	Inches	Inches
1	40 × 30	36 × 27
2	50 × 40	48 × 36
3	63 × 47	59½ × 45½
4	80 × 60	75 × 57½
5	96 × 72	90 × 66
6	108 × 84	104 × 78
7	126 × 96	122 × 91½

The smaller sizes of screen in the "traveller series" may be extended to give a square picture if so desired as they are adjustable. I should like to add that I quoted

screen sizes merely to illustrate a point in connection with screen illumination and hope the above details settle any doubts that may have arisen due to the past correspondence.

Edinburgh. T. B. SANSOM.

Engineering Qualifications

I FIND myself in much the same position as your correspondent "Ducat" (11th June). My engineering career began soon after the first world war; my parents had died while I was still at school and having no money I was forced to find employment which would provide sufficient income to support me in "digs." We had not yet reached the age of free education and Government grants.

Many men in their early twenties found themselves in the same position, through lack of funds unable to undertake a lengthy apprenticeship or to spend the time studying for an engineering degree.

In spite of the fact that a well known firm of national contractors has found my services sufficiently satisfactory to employ me for nearly twenty years, I find the "no qualification" bogey a definite drawback. Two applications for branch managerships have been decided against me on the score of: 1. "The policy of the company is to employ only managers with academic qualifications"; and 2. "We only employ engineers who have completed a full works apprenticeship."

In the design of installations or in carrying them out I have never found the lack of academic qualifications any handicap, and I do not believe that these requirements are really justified.

During my career I have worked alongside and met many supervising engineers, and my opinion is that—other considerations being equal—there is nothing to choose between the qualified and the unqualified, in fact the latter is usually more resourceful, a better organizer, and in general better equipped temperamentally.

"PLAIN MR."

N.A.L.G.O. CONFERENCE

PROCEEDINGS at this year's conference of the National and Local Government Officers' Association were conditioned by the fact that a special conference had taken place in April to discuss salary issues when it was decided to call for a general review of salary structures in all the services covered by the Association. In electricity, said Mr. G. R. Ashton, reporting for the National Executive Council on steps taken to implement the decision of the special conference, the staff side of the National Joint Council would be meeting next month to consider proposals. Most of the notices of motion on salaries were accordingly withdrawn and this brought about a much needed lightening of an overloaded agenda.

Mr. T. Nolan (Yorkshire Electricity Board), in his presidential address, claimed that the output of the nationalized services had gone up since 1948 by twice as much as the industrial average. It had done so, he added, much more economically. Food that cost £1 before the war now cost £2 6s 9d, but a pound's worth of electricity in pre-war terms to-day cost no more than 25s. Against this, he maintained, the local government and nationalized services were no longer in "the first flight of good employers." Staff, particularly those in the higher grades, were far worse off in terms of real costs than they had been in 1946.

At a meeting of delegates from the electricity supply industry Mr. L. G. Moser, the Association's organizing officer for electricity staffs, outlined the events of the year. He said that they had passed the stage of spectacular achievements and were now consolidating and removing weaknesses and anomalies. They had indeed achieved an all-round salary increase, but this was unfortunately little more than normal routine. Rising costs prevented salary increases from restoring purchasing power. Already they were more concerned with lodging a new claim than with that which had been settled only four months ago.

Mr. Moser said that the claim of the Electrical Power Engineers' Association for higher salaries for engineers was significant because for the first time it was openly based on the contention that, because electricity supply was an engineering industry, engineers should be paid more favourably than other people. This contention was rejected by N.A.L.G.O., who believed that administrators, accountants, and clerical staff were all essential to the industry and should work together for the common good.

The Electricity Re-organization (Scotland) Bill seemed likely to pass through Parliament, said Mr. Moser; it had been improved by the joint action of the trade unions who had ensured that the principle of a single negotiating body for the whole of the United Kingdom was preserved. Nevertheless, there would be some merging of two Boards and two generating Divisions, and there had been amalgamations in the North Western and Merseyside and North Wales Divisions, as well as in London and the East Midlands area. All of this made it increasingly desirable that staff and management should co-operate in matters arising out of reorganization.

Upon this question of reorganization, so soon after vesting day, although they recognized the need for maximum efficiency they realized also the danger of creating an atmosphere of uncertainty among the staff. They had a right to expect, especially in an industry which boasted a progressive attitude to labour relations, to be taken fully into the confidence of management.

A lively discussion arose on the Saturday afternoon opening of showrooms. Mr. Moser said that the Association opposed any worsening of staff conditions but that this was a question for the Electricity Boards; any consequent redistribution of working hours was a matter for local joint agreement. A delegate said that they had had Saturday afternoon opening for many years, that they had recently negotiated a five-day week, and that the staff were quite happy about it.

Critics of the advisory committee system suggested that it ought to be abolished. Mr. Moser warned them that they would lose some valuable rights of joint discussion if this were done; he was joining other staff representatives in a visit to Lord Citrine to sort out the respective functions of advisory and negotiating machinery.

A motion was carried instructing the executive to report on the implications of strike action by N.A.L.G.O. members. A report will be presented to next year's conference.

At the end of the proceedings Mr. Nolan inducted Mr. L. H. Taylor, of the town clerk's department, Salford, as his successor.

BOOKS RECEIVED

Automatic Voltage Regulators and Stabilizers. By G. N. Patchett. Pp. 335; figs. and index. Sir Isaac Pitman & Sons, Ltd., Parker Street, Kingsway, London, W.C.2. Price 50s.

The Electromagnetic Field in its Engineering Aspects. By G. W. Carter. Pp. 360; figs. and index. Longmans, Green & Co., Ltd., 6 & 7, Clifford Street, London, W.1. Price 35s.

Elements of Electrical Engineering. By A. L. Cook and C. C. Carr. Sixth edition. Pp. 681; figs. and index. Chapman & Hall, Ltd., 37, Essex Street, London, W.C.2. Price 54s.

Hair Dryers and Shavers

THE two appliances dealt with in this latest of our surveys of domestic electrical apparatus are both concerned with the toilet. Hair dryers, with a largely, but by no means entirely, feminine appeal, are still regarded by some as being in the luxury class. This attitude is unjustifiable when the saving effected by home shampooing and setting are taken into consideration and there is no completely safe alternative method of drying hair so quickly and efficiently.

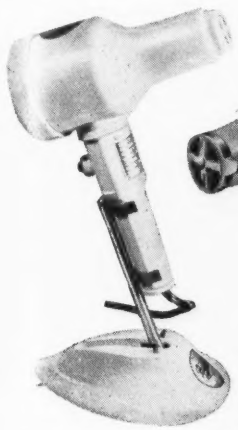
Hair dryers weigh on an average about 2 lb and models are available from 1¼ lb to 2½ lb. Some types can be supplied complete with stands but it should be remembered that no purchase tax is payable on the stands if they are purchased separately. Radio and television interference suppressors are refinements incorporated in many models either as standard or as extras. Built-in mirrors are other special features. White, cream, ivory and walnut are the most common finishes, but grey and crimson, and peach are also available. Most dryers are suitable for a.c. or d.c. but a few are designed for a.c. only.

If dry shavers have not so far made as much progress as might have been anticipated it can only be because the public is not aware of the improvements in performance which characterize the latest designs. Apart from the great convenience of being able to shave wherever an electricity supply is available, without the need for soap, hot water, etc., and without risk of cuts, the latest models have the additional advantage of being considerably quicker to use, one manufacturer in fact claiming that it is possible to complete a shave in under a minute. Besides the higher operating efficiency, developments have taken place recently both in comfort of holding and, to some extent as a consequence, in appearance. Models are available for all voltages from 6 V upwards, a dual range being supplied if required. Most types are suitable for both a.c. and d.c.

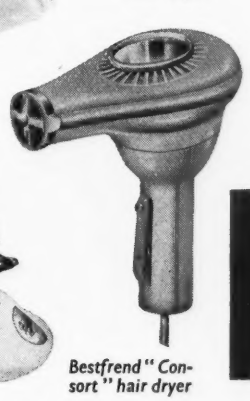
HAIR DRYERS

Manufacturer	Charles Alexander	Bestfrend			
Name or model	"Magicflow"	A	B	"Consort"	"Permaster" A	"Permaster" B
Weight	2½ lb	1¾ lb	1¾ lb	1¾ lb	2 lb	2 lb
Special features	Wide opening for air stream permits hair to be dried in "set" position	A.c./d.c.	A.c./d.c. Built-in mirror	A.c. only. Built-in mirror	A.c./d.c.	A.c. only
Finish	Cream with chrome fittings	Bakelite	Bakelite	Bakelite	Bakelite and polished chromium	
Price (excl. P.T.)	£5 0 0	£2 17 6	£3 5 0	Walnut: £2 16 10 Ivory: £3 4 0	£4 7 6	£4 0 0
Purchase tax	£0 18 9	£0 10 9	£0 12 2	Walnut: £0 10 8 Ivory: £0 12 0	£0 16 5	£0 15 0

Manufacturer	Brown Bros. ("Duco")		Bylock			
Name or model	"Boudoir"	"Boudoir"	"Queen"	"Streamline"	"Simoon"	"Zephyr"
Weight	2½ lb	2½ lb	2½ lb	2½ lb	2½ lb	2½ lb
Special features	Radio and TV interference suppressors 12s extra (plus 2s 3d P.T.). Stand 17s 6d extra (plus 3s 3d P.T. if sold with hair dryer)		Stand 17s 6d extra			
Finish	Walnut	Peach	White Bakelite	Chromium body, Bakelite handle	Coloured Bakelite	Sprayed metal body, Bakelite handle
Price (excl. P.T.)	£2 18 0	£3 4 0	£3 16 6	£3 19 6	£3 9 6	£3 9 6
Purchase tax	£0 10 10	£0 12 0	£0 14 0	£0 14 6	£0 12 8	£0 12 8



Left: Bylock "Queen" hair dryer

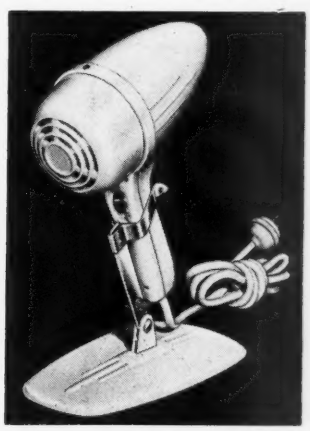


Bestfrend "Consort" hair dryer

Right: C.W.S. "Minor" hair dryer

Below: Charles Alexander "Magicflow"

Right: Brown Bros. "Duco" hair dryer



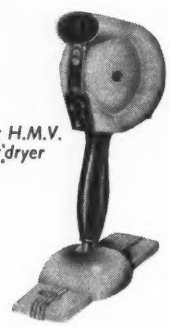
HAIR DRYERS . . . . . *continued*

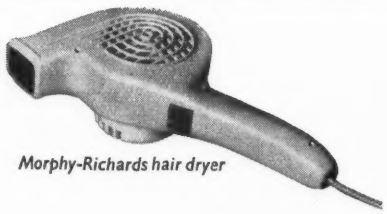
Manufacturer	C.W.S. ("Dudley")	Electrothermal			
Name or model	"Minor"	97	99	105	106
Weight	2¼ lb	1¼ lb	1¼ lb	1¼ lb	1¼ lb
Special features	—	Radio and TV interference suppressor	Comb attachment for waving. Switch for "hot air" and "off"	Radio and TV interference suppressor. Hot and cold switches	Radio and TV interference suppressor. Four heat regulator
Finish	Ivory plastic with dark handle	Ivory plastic	Ivory plastic	Ivory plastic	Ivory plastic
Price (excl. P.T.)	£3 3 2	£3 6 4	£6 17 9	£3 16 0	£4 13 9
Purchase tax	£0 11 10	£0 12 5	£1 5 10	£0 14 3	£0 17 7

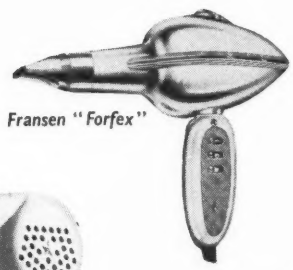
Manufacturer	Fractional H.P. Motors		Fransen	G.E.C.	H.M.V.	L. G. Hawkins
Name or model	"Sylentflo"	"Sylentflo"	"Forfex"	DM395	HD1	"Supreme"
Weight	2 lb 13 oz	2 lb 13 oz	2 lb	2 lb	2¼ lb	2½ lb
Special features	Radio and TV interference suppressors		Cold plus three heat air control	Stand 14s extra (plus 3s P.T. if sold with dryer). Separate switches for heater and fan	Adjustable stand	Stand 16s 6d (plus 3s 2d P.T. if supplied with dryer)
Finish	Walnut	Ivory	Plastic	Cream plastic	Bakelite in harmonizing colours	Ivory Bakelite
Price (excl. P.T.)	£4 15 0	£5 0 0	£7 9 9	£4 0 0	£5 5 0	£3 19 7
Purchase tax	£0 17 10	£0 18 9	£1 10 0	£0 15 0	£0 19 3	£0 15 0

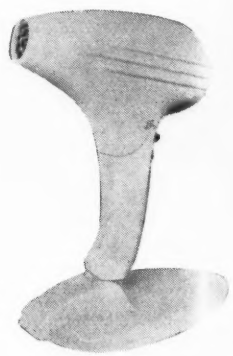
Manufacturer	Morphy-Richards	Ormond	Pifco	Siroma	
Name or model	H1	E.1022	1050	HD2	HD3
Weight	1 lb 11 oz	2 lb 2 oz	2 lb	2½ lb	2½ lb
Special features	Capacitor induction motor with heater thermostat	Switches for fan and heater	Hot or cold air control. TV interference suppression. Adjustable stand 18s 11d extra (plus 3s 6d P.T. if supplied with dryer)	Stand 17s 6d extra. Radio and TV interference suppressor extra	
Finish	(1) Ivory plastic (2) Grey/crimson plastic	(1) Walnut (2) Ivory plastic	Ivory plastic	Walnut Bakelite	Peach plastic
Price (excl. P.T.)	(1) £2 14 6 (2) £2 9 6	(1) £2 18 0 (in casket £4 3 0) (2) £3 3 0 (in casket £4 10 9)	£3 3 0	£2 18 0	£3 4 0
Purchase tax	(1) £0 10 2 (2) £0 9 3	(1) £0 10 10 (in casket £0 15 7) (2) £0 11 10 (in casket £0 17 0)	£0 11 6	£0 10 7	£0 11 7

Ormond E.1022 hair dryer

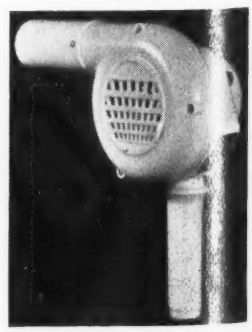

Right: H.M.V. hair dryer


Morphy-Richards hair dryer


Fransen "Forfex"

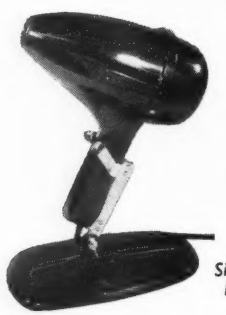

G.E.C. DM395

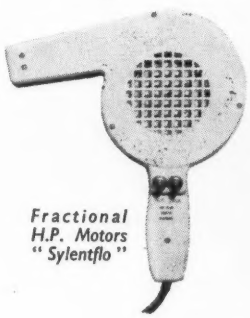
Below: L. G. Hawkins "Supreme"



Pifco Model 1050

Electrothermal Model 105


Siroma HD2 hair dryer

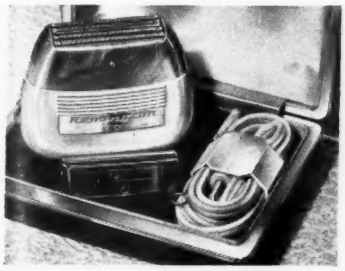

Fractional H.P. Motors "Sylentflo"

SHAVERS

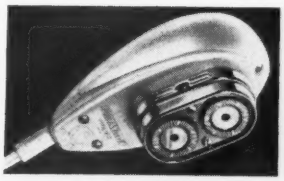
Manufacturer	Arvin			Braun	
Name or model	" 33 "	" De Luxe "	" Consort "	S.50	300
Type	3 heads, a.c./d.c.	Twin head, a.c./d.c.	Twin head, a.c. only	One vibrator head	One vibrator head
Weight	26 oz (in case)	19 oz (in case)	16·2 oz (in case)	10 oz	12 oz
Special features	Instantly detachable cutting heads	Detachable cutting head unit	Detachable cutting head unit	Surgical steel foil leaf 0·0015in thick	
Finish	Two colour shaver in real leather case	Cream plastic in two colour " Wind-a-Pak "	Ivory plastic in card box	Cream	Cream
Price (excl. P.T.)	£7 11 0	£3 17 0	£2 14 2	£5 6 8	£8 6 8
Purchase tax	£1 8 9	£0 14 5	£0 9 3	£1 0 0	£1 11 3

Manufacturer	Chilton			Fransen (" Rabaldo ")		
Name or model	" Buk "	" Kub "	" Kub Dual Volt "	" Dual-Ras "	" Multiras 1 "	" Multiras 2 "
Type	Five-in-one vibrator head	Five-in-one vibrator head	Five-in-one vibrator head	Twin blade 200–250 V a.c./d.c.	Four blade 200–250 V a.c./d.c.	Four blade 100–250 V a.c./d.c.
Weight	14½ oz	11½ oz	11½ oz	8 oz	10 oz	10 oz
Special features	On/off switch. Voltage control	Variable voltage control	Adjustment for 110 V and 230 V	No outer guard. Other voltages from 6V at no extra charge		
Finish	Cream urea	Cream polystyrene	Cream polystyrene	Ivory plastic	Ivory plastic	Ivory plastic
Price (excl. P.T.)	£4 15 1	£3 7 4	£3 16 3	£6 13 0	£8 15 0	£9 15 0
Purchase tax	£0 18 6	£0 12 7	£0 14 2	£1 6 9	£1 15 10	£1 19 7

Manufacturer	Philips	Remington Rand		Rolls		
Name or model	" Philishave "	" 60 " Regular	" 60 " Dual Volt	" Twin-Four "	Universal	A.C.
Type	Two rotary head	Multi-headed a.c./d.c.	Multi-headed a.c./d.c.	Multi head a.c./d.c.	Single head a.c./d.c.	Single-head a.c. only
Weight	8½ oz	8½ oz	8½ oz	1 lb 15 oz	1 lb 10 oz	1 lb 12 oz
Special features	—	210–250 V and 110–125 V	110–150 V and 190–250 V	90–250 V	90–250 V	200–250 V
Finish	Ivory urea and chromium	Cream and mottled fawn	Cream and mottled fawn	Ivory	Ivory	Maroon
Price (excl. P.T.)	£6 4 11	£8 6 0	£9 3 0	£7 7 0	£5 13 0	£4 10 0
Purchase tax	£1 4 4	£1 13 0	£1 16 1	£1 9 4	£1 0 8	£0 16 6



Remington Model 60



Philips " Philishave " 7743

Arvin " De Luxe " shaver

Braun Model S.50

Rolls " Viceroy Twin-Four "

Chilton " Buk " shaver

Fransen " Multiras " shaver

LIST OF MANUFACTURERS

Alexander, Charles, & Co., Ltd., 74, Portsmouth Road, Surbiton.
Arvin Electric Co., Ltd., Fernbrook Avenue, Southend-on-Sea.
Bestfrend Electrical Co., Ltd., Diceland Works, Banstead.
Braun (Bletchley), Ltd., Balham Road, London, N.9.
Brown Bros., Ltd., Great Eastern Street, London, W.C.2.
Bylock Electric, Ltd., South Street, Enfield.
Chilton Electric Products, Ltd., Hungerford, Berks.
Co-operative Wholesale Society, Ltd., National Works, Hall Street, Dudley.
Electrothermal Engineering, Ltd., 270, Neville Road, London, E.7.
Fractional H.P. Motors, Ltd., Rookery Way, The Hyde, London, N.W.9.
Fransen, John A., Ltd., Northwood, Middlesex.
General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.
H.M.V. Household Appliances, Hayes, Middlesex.
Hawkins, L. G., & Co., Ltd., 30–35, Drury Lane, London, W.C.2.
Morphy-Richards, Ltd., 121, Victoria Street, London, S.W.1.
Ormond Engineering Co., Ltd., Rosebery Avenue, London, E.C.1.
Philips Electrical, Ltd., Century House, Shaftesbury Avenue, London, W.C.2.
Pifco, Ltd., Pifco House, Watling Street, Manchester.
Remington Rand, Ltd., 119, New Oxford Street, London, W.C.1.
Rolls Razors, Ltd., 255, Cricklewood Broadway, London, N.W.2.
Siroma Engineering Co., Ltd., North Acton Road, London, N.W.10.

Financial Section

STOCKS and SHARES

THE reactionary tendencies which affected Stock Exchange markets nearer the start of the month proved to be short-lived. By the beginning of this week, confidence seemed to have regained the upper hand. Industrial markets again received assistance from some good company news, notably from the general review of affairs at the I.C.I. annual meeting. There it was stated that the company had shared in this year's industrial expansion, and prospects were said to be generally good. The shares immediately concerned put on another 3s 3d to 68s 6d, easily the best price ever quoted for them. The share-for-share capital distribution is to be made in the middle of next month. Other encouraging results came during the week from B.E.T. and E. K. Cole.

Price Changes

W. H. Allen £1 shares, now 66s 3d, have added 2s 6d to the previous rise of 6s 3d induced by the declaration of increased earnings and distributions. Dealings have been marked up to 68s 9d. In the same section of the market, Babcocks gained 2s 3d, Thornycroft a further 1s 3d and Tube Investments 2s 6d. Brook Motors were again conspicuous; at 42s 6d they are about 7s to the good over this month. Other improvements to note were those in Plessey (as usual), Siemens, Aberdares and British Thermostat. Venner 5s shares were quoted at 10s 6d after news of the maintenance of the dividend at 15 per cent. Ultra Electric announce a substantial improvement in profits, and are making a second successive increase in the dividend, this time from 12½ to a still well-covered 15 per cent. The 5s shares changed hands subsequently at around 13s 3d. Broadcast Relay were good at 43s, as were Vickers at 35s ex bonus. Vickers new shares stand about 6d higher than the old—the new shares are at present free of transfer stamps.

Pye Prospects

Financial year of Pye, Ltd., ended in March, and on last year's precedent the preliminary results and the single ordinary dividend declaration will appear next month. The dividend will apply this time to capital increased by a one-for-two share bonus (in "A" shares) since last year's payment of 20 per cent. Adjusting that rate to the present capital, the yield on the 5s deferred shares is barely 3 per cent at their present price, which has risen during the course of this year from 16s to 21s 6d, after being as high as 24s 3d. From this, the inference may be drawn that the market is hopeful of a larger payment. At the time of the issue, the company said they expected in the ordinary course of events to pay

Week's Price Changes

Company or Board	Nom. Value	Middle price 21st June	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield %	1954 Highest	1954 Lowest
Gilt-edged Stocks						£ s d		
Brit. Elec. 1968/73	100	93	−½	3	3	3 4 6	93½	88
Brit. Elec. 1974/77	100	92		3	3	3 5 3	92	87
Brit. Elec. 1976/79	100	97½	+½	3½	3½	3 11 10	97½	93
Brit. Elec. 1974/79	100	106		4¼	4¼	4 0 2	106	103¾
Overseas Electric Supply								
Calcutta Elec.	£1	21/-	+1/-	6†	6†	5 18 6†	21/-	18 7
East African Power	£1	20/-		7	7	7 0 0	23/4	20 -
Nigerian Elec.	£1	24/6		10	10	8 3 4	25/-	23 6
Palestine Elec. "A"	£1	20/6		Nil	Nil	Nil	20/6	16 -
Perak Hydro-Elec.	£1	14/-	−3d	Nil	6	8 11 6	15/6	13 9
Equipment and Manufacturing								
Aberdare Cables	5/-	10/6	+1/-	25	12½*	5 19 0	10/6	8 1
Aerialite	1/-	11/-	−9d	88½	88½	8 0 6	12/3	10 9
Allen, W. H.	£1	66/3	+2/6	15	20	6 0 9	126/3	50 -
Aron Elec. Ord.	£1	50/-		15	20	8 0 0	50/-	43 -
Assoc. Elec. Ord.	£1	51/3	+1/3	20	11½*	4 7 9	51/3	41 6
Automatic Tel. & El.	£1	73/-	−9d	15	15	4 2 3	75/-	62 9
Babcock & Wilcox	£1	57/3	+2/3	18	12*	4 4 0	57/3	47 3
Baldwin, H. J.	2/-	4/6	−3d	20	20	8 17 9	5/6	3 9
Bakelite	10/-	26/3	−9d	12½	12½	4 15 3	27/6	23 6
British Aluminium	£1	34/6		12	10	5 16 0	40 -	34 6
B.I. Callender's	£1	41/6	+6d	10	10	4 16 5	44/-	37 9
B.I. Callender's 6% Pref. ...	£1	26/-		6	6	4 12 3	26/-	24 3
British Thermostat	5/-	30/-	+1/3	35	27½*	4 11 9	28/9	17 6
British Vac. Cleaner	5/-	13/-	−6d	25	25	9 12 3	14/6	11 6
Brook Motors	10/-	42/6	+2/6	20	20*	4 14 3	42/6	33 3
Brush Ord.	5/-	6/6	+6d	4	6	5 0 0	7/-	3 6
Bulgin, A. F.	1/-	3/3		30	30	9 4 6	3/7	3 2
Burco	5/-	14/6		35	35	6 0 8*	14/6	12 1
Chloride El. Storage	£1	62/6		20	12½*	4 0 2	62/6	46 6
Clarke Chapman	£1	55/6		17½	20	—	57/6	47 6
Cole, E. K.	5/-	31/-	+2/6	25	27½	4 8 9	31/-	22 6
Cossor, A. C.	5/-	7/6	−3d	10	10	6 13 4	8/11	7 -
Crabtree	10/-	29/3	+6d	17½	17½	5 19 8	29/6	23 9
Crompton Parkinson Ord. ...	5/-	17/6	−6d	11¼	20	5 14 3	18/-	14 -
De La Rue	5/-	13/6		35	Nil	Nil	14/10	12 3
Decca	4/-	37/6	−9d	150	35*	—	38/3	32 -
Desoutter	5/-	18/9		18	20	5 6 8	18/9	16 1
Dewhurst	2/-	6/-		19	19	6 6 9	6/3	5 1
Dictograph Tel.	2/-	6/-		20	20*	6 13 4	6/3	5 2
Dubilier Condenser	1/-	5/3	−3d	28	25*	4 15 0	6/-	4 1
E.M.I.	10/-	14/-		12	8	5 14 4	14/9	11 3
Electrical Components	5/-	11/3		20	20	8 17 10	11/6	10 9
Elec. Construction	£1	61/3		15	15	4 18 0	61/3	53 -
Enfield Cable Ord.	£1	20/-		5	Nil	Nil	22/3	16 6
English Electric	£1	43/9	−2/-	15	10*	4 11 4	45/9	38 -
English Electric 3¾% Pref. ...	£1	16/6		3¾	3¾	4 11 0	16/6	15 3
Ericsson Tel.	5/-	25/9		22†	25†	2 8 6†*	26/3	22 9
Ever Ready	5/-	23/3		35	40	—	37/-	23 3
Falk Stadelmann	£1	37/6	−1/3	15	15	8 0 0	41/-	36 9
G.E.C. Ord.	£1	42/6	−2/-	22½	11¼*	5 6 0	44/6	37 9
G.E.C. 6½% Pref.	£1	27/-		6½	6½	4 16 3	27/3	26 3
General Cables	5/-	16/3	−6d	30	30	9 4 8	16/10	16 3
Greenwood & Batley	£1	46/3	+1/3	15	17½	7 11 3	46/3	40 3
Hackbridge Cable	5/-	14/-		20	20	6 15 7	15/3	11 7
Hackbridge & Hewittic	5/-	21/3		20	20	4 14 0	21/3	16 10
Hall Tel. Acc.	10/-	10/6		10	10	9 2 8	11/11	10 4
Heatrae	2/-	4/9		12½	12½	5 5 3	4/9	4
Henley's	10/-	19/6	+6d	10½	10½	5 7 8	19/6	15 6
Holophane	5/-	14/9		20	20	6 15 7	15/-	13 -

* After capital bonus. † Free of income tax.

The above quotations are based upon middle prices in the Stock Exchange Daily Official List.

subsequently a dividend at least equivalent to the previous rate.

Progressive Record

The Pye Company's record since the war has put the shares well in the category now commonly classified as "growth" stocks, on which investors are prepared to accept relatively small current returns in consideration for long-term potentialities calculated to be above the ordinary. Taking only the last five annual accounts, the Pye group's trading profit can be seen to have been more than trebled, the latest figure being just under the million mark. Increasing taxation and other charges have retarded the expansion of the annual net surpluses, which have nevertheless doubled in size over the period. Dividends have been raised by cautious stages from the equivalent of 12½ per cent (before the 100 per cent capital bonus of 1951) to last year's rate of 20 per cent.

...in Electrical Investments

Company or Board	Nom. Value	Middle price 21st June	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield % £ s d	1954 Highest	1954 Lowest
Equipment and Manufacturing—continued.								
Hoover	5/-	36/3	+6d	25	45	6 4 3	36/-	26/3
I.C.I.	£1	68/6	+3/3	13	15	4 7 7	65/3	52/9
Intl. Combustion	5/-	23/-		15	20	4 7 0	23/-	14/6
Johnson & Phillips	£1	47/6	−6d	15	15	6 6 3	52/3	48/-
Lancashire Dynamo	£1	56/9	+6d	12½	14	4 18 9	56/3	43/-
Laurence, Scott	5/-	20/3	+1/-	15	20	4 18 9	19/9	14/-
Lister, R. A.	£1	42/-	−1/-	9	12	5 14 3	43/6	31/9
London Elec. Wire	£1	43/9	+1/3	15	10*	4 11 4	46/3	38/-
Lucas, J.	£1	65/9		9⅛	10⅛	3 6 0	65/9	50/3
Marryat & Scott	2/-	7/-		22½	22½	6 8 8	7/-	5/11
Mather & Platt	£1	72/-	+1/-	12½	15	4 3 4	71/-	53/1
Metal Industries	£1	32/3		15	12*	7 9 3	42/3	29/6
Midland Elec. Mfg.	£1	67/6		15	15	4 9 0	67/6	63/-
Morphy-Richards	4/-	18/9		40	40	—	18/9	11/4
Murex	£1	54/9	−1/-	15	15	5 9 6	56/3	50/-
Newman Ind.	2/-	2/3		10	10	8 17 9	2/6	2/-
Oldham & Son	1/-	3/-		35	17½*	5 16 8	3/4	2/5
Parnall (Yate)	5/-	6/9	+6d	6	8	5 18 6	6/9	4/3
Parsons, C. A.	£1	51/3	+1/3	12½	7½*	2 18 6	51/6	38/1
Plessey	10/-	48/9	+2/6	25	30	—	54/-	37/10
Pye Deferred	5/-	21/6	−6d	18	20	—	24/3	15/7
Revo	10/-	19/6		27½	27½	—	19/6	16/7
Reyrolle	£1	82/6		12½	13¾	3 6 8	83/9	66/-
Rheostatic	4/-	12/6		19	20	6 8 0	12/9	11/-
Richardsons Westgarth	5/-	10/9		12	15	—	11/-	6/6
Scottish Cables	4/-	17/3	+3d	20	27½	6 7 7	17/3	12/11
Siemens Ord.	£1	36/-	+2/3	10	10	5 11 1	43/9	33/9
Smith (England), S.	4/-	10/6		12½	15	—	11/3	7/8
Southern Areas	£1	18/6		5	6	6 9 9	20/-	17/6
Strand Elec.	5/-	8/9		17½	17½	10 0 0	9/3	8/3
Sturtevant	5/-	37/6	−1/3	18·1†	18·9*†	2 10 6†	38/9	29/-
Sun Elec.	£1	32/6		15	15	9 4 8	32/6	27/6
Switchgear & Cowans	5/-	12/9		22½	10	3 18 6	13/7	9/9
Taylor Tunnicliff	5/-	11/-		25	12½*	5 13 9	12/4	10/7
T.C.C.	10/-	32/6		20	30*	—	31/3	21/3
T.C. & M.	£1	30/3xr		10	8½*	5 12 6	34/6	30/3
Telephone Mfg.	5/-	8/6		10	10	5 17 9	8/6	7/6
Thorn Elec.	5/-	18/9	+1/3	12½	12½	3 6 10	17/6	13/3
Thornycroft	£1	42/6	+1/3	15	15	7 1 3	41/3	33/4
Tube Investments	£1	68/9	+2/6	15*	15	4 7 3	68/9	60/3
Vactric	5/-	15/9		Nil	10	3 3 6	17/6	7/6
Veritys	5/-	6/-		10	12½	10 8 3	8/3	5/-
Walsall Conduits	4/-	51/3		70	70*	5 9 3	51/3	44/-
Ward & Goldstone	5/-	53		45	45*	4 5 9	52/6	41/3
Watford	2/-	6/-		25	22½*	—	6/3	4/7
Westinghouse Brake	£1	66/3	−9d	14	15	4 10 6	68/10	60/9
West, Allen	5/-	14/3		15	17½	6 2 10	15/3	12/7
Wolf Electric	5/-	13/3		15	17½	6 12 0	13/10	11/-
Trusts, Transport and Communications								
Anglo-Am. Tel.:								
"A" Ord.	100	82½		—	6	7 5 6	89½	80
Ord.	100	52⅛		—	3⅜	7 2 10	55½	52
Anglo-Portuguese	£1	22/6xr		8	8	7 2 3	24/-	21/-
Brit. Elec. Traction: Def. Ord.	5/-	53/-	+7/-	35	50	4 14 3	53/-	39/1
Cable & Wireless: Ord.	£1	38/-		8	9	4 14 9	40/6	26/2
5% Loan	100	98½		4	4	4 1 3	98½	95½
Calcutta Trams	£1	18/6	+6d	6†	2½†	—	19/3	17/1
Cape Elec. Trams	£1	15/-		5½	5½	7 6 8	15/3	12/4
Marconi Marine	£1	33/9		10	10	5 18 6	33/9	27/6
Oriental Tel. Ord.	£1	77/-		16	16	—	80/6	73/9
Telephone Props.	£1	4⅜		8	8	—	5⅛	4⅛
Telephone Rentals	5/-	9/3	+3d	10	10*	—	10/3	9/-

Ekco Results

E. K. Cole 5s shares put on 2s 6d, to 31s after the announcement of the final dividend, which raises the rate for the year from 25 (of which the interim was paid on smaller capital) to 27½ per cent. This leaves the yield on the shares a trifle under 4½ per cent, a return which is evidently related to the high rate of the group's earnings, as well as to the "growth" characteristics attributed to the radio and electronic industries. With the trading profit for 1953–54 up to £589,000, net taxed earnings have expanded by a third to £181,000. Tax charges amount altogether to as much as £408,000, suggesting that the excess profits levy again exacted a heavy toll, although it operated for only three-quarters of the year. Even with this charge, the ordinary dividend appears to be covered between three and four times by the distributable surplus of earnings.

T.C. & M. Preference

Dealings in the half-million new Telegraph Construction & Maintenance 5 per cent cumulative redeemable preference shares opened at a premium of 1s (easing later to 6d) on the price of 20s at which they are offered to ordinary stockholders. At present the preference shares are 5s paid, with the balance of 15s due on 12th July. Until then, they will be available free of the 2 per cent transfer stamp duty on a purchase. The yield of a fraction under 5 per cent to a new buyer compares satisfactorily with the current return from other high-grade preference shares, which have of course long been in the ascendent on the strength of the rise in gilt-edged security prices.

Cover and Prospects

A statement accompanying the T.C. & M. preference share offer shows the principal amount of the issue to be covered some eight times by the net assets of the group, and the annual dividend charge fourteen times by average profits of the past three years. Proceeds of the issue are to be used largely for new capital expenditure. Orders are said to be coming in well for all departments except those concerned with power cable. On the latter account, it is thought that there may be some reduction in the year's profits, but the phase is regarded as temporary.

REPORTS and DIVIDENDS

Scottish Cables, Ltd.—The main figures in the accounts were given in our issue of 4th June. In his circulated statement, Mr. W. Fraser (governing chairman) says that the associated company, Scottish Cables (South Africa), Ltd., has again been able to increase its dividend. During the year under review many important contracts were executed at home and abroad, and the directors have continued to keep under constant review the possibility of further extending manufacturing facilities abroad. Additional ground of 10 acres has been acquired adjoining the present works site and extensions and new equipment are being proceeded with in connection with the rubber insulated and plastic insulated cable sections of the business. Certain other extensions are contemplated. Arrangements are also in hand to extend activities in the manufacture of telephone cables. Recently a wholly owned subsidiary was incorporated with the title Scottish Telephone Cables & Equipment, Ltd., with the intention, if occasion so demanded, to operate the telephone cable business by this new company. Arrangements are being made to proceed on a commercial basis with the production of aluminium sheathed cables. The current year has started off with full order books.

Aberdare Cables (Holdings), Ltd.—The annual meeting was held on 10th June. In his circulated statement, Mr. F. G. Penny (chairman and managing director) said that the year under review had been difficult due to the fact that the Area Electricity Boards and the National Coal Board had been absorbing stocks which they had accumulated over the previous period. In his last review he mentioned that with the improved position in the supply of raw materials the arrears of orders were rapidly overtaken by the cable-making industry with the consequence that buyers' stocks rose to unduly high levels. It was inevitable that many months would elapse before these stocks could be digested. There was now a much healthier appearance and the home trading was working on a more even keel with reasonable orders and realizable delivery dates.

In spite of strong worldwide competition, during the year substantial contracts were secured for cables for India, Pakistan, the Middle East and the Dominions and Colonies. During the current year there had been a steady monthly improvement in the home order book compared with the previous twelve months and a number of yearly contracts had been secured. There had been recently encouraging further attractive export orders from Australia, India and the Middle East. The chairman referred to the recent order received from the U.S.S.R. valued at £250,000.

With regard to South Wales Switchgear, Ltd., he reported a larger order book and increasing output from the Blackwood and Treforest factories.

The Telegraph Construction & Maintenance Co., Ltd.—Following approval given at an extraordinary meeting held on 4th June to the increase of capital by the creation of 1,000,000 redeemable preference shares of £1 each, the directors have now decided to issue forthwith at par 500,000 of such preference shares as 5 per cent cumulative redeemable preference shares, which are offered to ordinary shareholders in the proportion of one share for every four ordinary shares held. The proceeds of the issue will be used mainly in assisting the completion of the programme of renewal and expansion of plant and machinery and also to some extent for financing the development of activities overseas through subsidiary or associated companies.

Venner, Ltd.—For the year ended 31st December the profit on trading, after providing for all charges including depreciation, amounted to £83,266, as compared with £73,902 in 1952. To this is added £15,345 (£14,102) balance brought forward and £3,000 (£7,621) amounts set aside for taxation in earlier years and not now required, making a total of £101,611 (£95,625). A sum of £10,000 is again transferred and after paying an ordinary dividend of 15 per cent, £16,609 (£15,345) is carried forward. In his speech to be delivered at the annual general meeting on 13th July Mr. A. A. Rowse, the chairman, says that new additions to plant and machinery costing approximately £19,000 were made during the year to enable the company to cope with increased demands for its products. The additional plant became productive immediately it was installed. There are favourable prospects for sales of parking meters for privately owned parks. The battery developments continue and activities in electronics have made good progress.

Telephone Rentals, Ltd.—A widening scope of operations is indicated in a statement by Mr. F. T. Jackson, chairman and joint managing director, presented at the annual general meeting last Monday. A few years ago business was opened up in Johannesburg and Cape Town. This is now very successful and is in a position to pay for its requirements in equipment and also is earning satisfactory profits. During the past year an office has been opened in Toronto and later it is intended to open up in other parts of Canada. The company has also acquired a half-interest in a business in Australia which has a quite substantial rental revenue.

The Mirrlees Watson Co., Ltd.—Group profits, before taxation, for the year to 31st March last are £330,967, as compared with £175,995 for the previous year, and the net balance is £146,646 (against £81,021). General reserve receives £66,453, and it is proposed, in addition to maintaining the ordinary dividend for the year at 15 per cent, to pay a bonus of 5 per cent. The balance carried forward is £23,045 (against £37,672 brought in).

E. K. Cole, Ltd., report a group profit, before taxation, for the year ended 31st March last of £588,832, as compared with £534,802 for 1952–53, and after providing £407,500 for taxation, the net balance is £181,332, an increase of £47,130. It is proposed to pay a final dividend of 17½ per cent (against 15 per cent), making 27½ per cent for the year. For the previous year the total distribution was 25 per cent, but the interim dividend of 10 per cent was paid on capital before a one-for-six scrip issue.

The British Electric Traction Co., Ltd.—The aggregate group profit for the year ended 31st March last was £2,697,316, as compared with £2,238,447 for 1952–53. After providing £1,257,549 for taxation, £33,890 for capital increase costs and £148,954 minority interests, the amount attributable to the parent company is £1,256,923 (£1,058,560). It is proposed to pay a final dividend on the deferred ordinary capital of 35 per cent (against 25 per cent), making 50 per cent for the year (35 per cent).

The directors propose to make a two per cent scrip issue on which a dividend of not less than 20 per cent is forecast for the current year. This will be distributed in "A" deferred ordinary to deferred and "A" deferred ordinary stockholders, in the proportion of two for every 5s of such stock held.

Ruston & Hornsby, Ltd.—A fall in the group profit of £212,088 to £2,820,730 is reported for the year to 31st March, and the group net profit, after deducting £1,164,382 for taxation, £458,185 for depreciation, £120,000 for plant replacement, and £15,460 debenture interest, is £1,062,703 (against £1,126,522), of which £323,426 is retained by subsidiaries, leaving the balance of the parent company at £739,277. To this is added £251,238 brought in, making £990,515. General reserves receive £440,488 and the ordinary dividend for the year is 12½ per cent. A similar payment was made in the previous year, 1½ per cent of which was a Coronation bonus. The balance carried forward is £255,227.

The Plessey Co., Ltd., announces that the offer to shareholders of 600,000 ordinary shares of 10s each at 30s per share was accepted by about 99 per cent and that applications for additional shares amounted to over fifty times the number of shares available. Applications for the additional shares have had to be heavily scaled down.

Ultra Electric (Holdings), Ltd., reports a group net profit for the year to 31st March last of £219,301 as compared with £175,767 for the previous year. Taxation absorbed £128,124. It is proposed to pay a dividend for the year of 15 per cent (against 12½ per cent), on increased capital.

Greenwood & Batley, Ltd., report a profit for the year to 31st March last, after all charges, including £125,532 for taxation, of £82,083, as compared with £65,408 for 1952–53. Reserves receive £10,000, and it is proposed to pay a final dividend of 12½ per cent (against 10 per cent and a bonus of 2½ per cent), again making 17½ per cent for the year.

Keith Blackman, Ltd., report a profit for the year to 31st March last of £414,331, as compared with £649,982, and after providing £137,865 for taxation, the net balance is £136,159 lower at £276,466. General reserve receives £90,000 and the dividend for the year is maintained at 2½ per cent. The balance carried forward is £108,208 (against £106,507 brought in).

The Atlas Electric & General Trust, Ltd.—At the annual meeting held on 17th June, Lord Remnant (chairman) said that it was planned to make a private issue in the immediate future of £1,250,000 4 per cent debenture stock.

The Anglo-Portuguese Telephone Co., Ltd.—Underwriting has been completed for the issue of 1,000,000 6 per cent cumulative preference £1 shares at par, the subscription list for which will open and close on 29th June.

J. & E. Hall, Ltd., announce an interim dividend of 2½ per cent (unchanged).

Aron Electricity Meter, Ltd., reports the profit for the year ended 31st March amounting to £165,722 (£176,368). After taxation totalling £112,957 (£134,567), the net profit was £52,765 (£41,801). A dividend of 15 per cent (same, plus a bonus of 5 per cent) is to be paid, general reserve receives £20,000 (£15,000) and a sum of £20,000 (£5,000) is allocated to the replacement of fixed assets. The carry-forward is increased from £57,518 to £57,748.

The Broadcast Relay Service, Ltd., is to pay a final ordinary dividend of 12 per cent, tax free (10 per cent), making 22 per cent (18 per cent, including an interim dividend of 8 per cent paid on a smaller capital). The group trading profit has increased from £1,959,418 to £2,431,064 and the net profit, after taxation, etc., from £475,564 to £569,762.

Liquidations

Electric Cables, Ltd.—Special resolution passed on 3rd June that the company be wound up voluntarily. Liquidator, Mr. T. J. Bond, 3, Great Winchester Street, London, E.C.2, appointed 3rd June.

Relay Holdings, Ltd.—Winding up voluntarily. Claims to the liquidator, Mr. L. W. Robson, 59, New Cavendish Street, London, W.1, by 31st July.

Beam (Electronic Engineers), Ltd., electronic engineers, 233–235, Lewisham High Street, Lewisham.—Liquidator, Mr. J. M. Clarke, Senior Official Receiver and Liquidator, 346, Strand, London, W.C.2, released 4th June.

Lincoln & Egerton, Ltd., electrical dealers and contractors. — Resolution passed 3rd June, pursuant to section 143 of the Companies Act, 1948, that the company be wound up voluntarily. Liquidator, Mr. R. G. R. Sisson, 2, South Quay, Great Yarmouth, appointed 3rd June.

Bankruptcies

H. Bullock, trading as H. Bullock & Sons at 17, High Street, Bromyard, Herefordshire, electrical engineer.—Last day for receiving proofs for dividend 26th June. Trustee, Mr. W. Le'R. Hand, Colmore House, 21, Waterloo Street, Birmingham, 2.

D. J. Hartshorne, carrying on business at 778, New Hey Road, Huddersfield, and also at Brook Royd Mills, Stainland, near Halifax, under the style of Boyce Weir & Co., electrical and mechanical engineers.—Trustee, Mr. N. Smith, 12, Market Street, Hebden Bridge, Yorks., appointed 10th June.

J. G. Milne, 34, Whitworth Road, Grangetown, Yorks., radio and electrical dealer.—First and final dividend of 4s 7½d in the £, payable on and after 30th June at 62–63, High Street, Stockton-on-Tees.

C. G. Clews (" Clews Electrical Co."), electrical contractors, 226, Stafford Street, Walsall.—Discharged as from 20th June.

F. E. V. Hooper, electrical engineer, 7, South Road, Walkley, Sheffield; also carrying on business as " Hoopers Service Station " at Walkley Road, Walkley.—Proofs for dividends by 3rd July to the Trustee, Mr. J. B. G. Moore, Official Receiver, 55, Queen Street, Sheffield, 1.

S. Whitton and **L. Whitton** (" F. Whitton & Sons "), electrical engineers, Church Place, Victoria Road, Leeds, 5.—Trustee, Mr. R. B. Smith, 3, Alfred Street, Leeds, 1, appointed 14th June.

PARLIAMENTARY REPORT

IN the House of Commons last week Mr. Wyatt asked the President of the Board of Trade under what international agreement the Government was prevented from permitting the export of an unlimited quantity of generators of more than 750 kW to the U.S.S.R.

Mr. Heathcoat Amory said that there was no formal international agreement. It was, however, the policy of the Government, as it was that of the previous Government, to operate security controls in conjunction with other friendly governments.

Mr. Wyatt asked if they had not now arrived at a most ridiculous position. The Minister had told the House that he himself allowed these generators to go, but that he fixed a limit to them. Had not the Prime Minister stated that he was anxious that all these controls should be removed, so far as possible, and to some extent had they not already been removed? Had not the President of the Board of Trade continually stated that the reason why they had not all been removed lay in the negotiations in Paris? But this matter had nothing to do with them; this control could be removed by the Minister.

Mr. Amory said it had very much to do with the consultations taking place in Paris, because the quantitative limits were agreed in consultation with other countries.

Mr. Bing asked the President of the Board of Trade how many applications for licences, and to what value, had been received by his department for the export of cables and cable products to China, Poland, Roumania and the U.S.S.R., respectively, since 1st July, 1953.

Mr. Heathcoat Amory gave the following information:—China: Applications allowed three, value £10,710; refused fourteen, value £468,679. Poland: Applications allowed three, value £754,566 (including one for £754,540 covered by open general licence); refused six, value £76,370. Roumania: No applications. U.S.S.R.: Applications allowed three, value £1,101,163 (including one for £331,500 covered by open general licence and one for £408,000 for which no licence was required); refused nil.

Rating of Power Stations

Mr. Leather raised the question of the rating of power stations, particularly the one at Portishead, Somerset, which, he said, threw a very heavy burden on the ratepayers. He said they had the ridiculous situation in which urban districts with power stations had to find enormous amounts of money to pay for additional facilities, such as housing subsidies and road maintenance for which they got very little relief from the central pool, whereas neighbouring districts, with no burden thrown on the ratepayers, got an enormous windfall. Portishead was granted only about £569 out of the pool, and the council had to find more than that in subsidies alone. In the next district, five miles away, no burden arose in connection with a power station and it got from the Exchequer a gift of about £1,300. That was unjust and he hoped the Minister would treat the problems of the electricity industry as they proposed to treat the gas industry.

Mr. Ernest Marples, the Parliamentary Secretary to the Ministry of Housing and Local Government, said they would like to consider how the new proposals for the gas industry worked out, and if they were satisfactory allied principles could be applied to other industries of a similar nature.

Fuel Efficiency

Mr. Palmer asked the Minister of Fuel and Power if he would state the total saving in coal consumed by the nationalized electricity and gas industries, due to improved technical efficiency, since vesting date in each case.

Mr. Geoffrey Lloyd.—Approximately 12 and 2 million tons respectively.

Mr. Palmer asked if the Minister agreed that these savings were a tremendous tribute to the soundness of the policy of nationalization of those industries.

Mr. Geoffrey Lloyd said that that would not really be the case because even more sensational savings of fuel were made under private enterprise between the wars.

Asked by Mr. Palmer whether the transfer of the Ministry's Fuel Efficiency Service to the new Fuel Advisory Company was now completed, Mr. Geoffrey Lloyd said that it was. An officer of his Department had been appointed an observer and both at administrative and technical levels they were maintaining close touch with the service.

Management Accounting

THE Council of the Institute of Chartered Accountants in England and Wales, Moorgate Place, London, E.C.2, has issued " Management Accounting —an outline of its nature and purpose." Its object is to remove some misunderstandings about the nature of management accounting, stimulate active interest in its future development and encourage business men to make the fullest use of accounting information in the day to day management of their businesses. Copies of the booklet may be obtained free of charge from the Institute.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s 8d each including postage) will be obtainable after 4th August from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1950

3244. British Driver-Harris Co., Ltd.—Electrode elements. 8th February, 1950. (713063.)

8378. Electric & Musical Industries, Ltd.—Circuits incorporating cathode-ray tubes. 4th April, 1951. (713165.)

10066. General Electric Co., Ltd., and Cates, J.—Circuits for operating electric discharge lamps. 25th May, 1951. (712815.)

14102. General Electric Co., Ltd., and Sherwen, J. W.—Methods and apparatus for conveying materials and articles. 6th June, 1951. (712978.)

15807. Hart, M.—Electric pumps. 6th February, 1951. (713067.)

20539. General Electric Co., Ltd., Chubb, A. A., and Halliday, V. N.—Electrical capacitors, more particularly for electric discharge lamp circuits. 3rd August, 1951. (712819.)

24184. Peters, J. A., Bird, R. C., and Puttick, H. G.—Electric generating plant. 3rd January, 1952. (713166.)

28717. Marconi's Wireless Telegraph Co., Ltd.—Amplitude limiter circuits. 27th July, 1951. (713168.)

30340. Hotpoint Electric Appliance Co., Ltd.—Thermal responsive electric switches. 8th November, 1951. (713070.)

1951

1244. Electrical Apparatus Co., Ltd.—Electrical load controlling devices. 7th January, 1952. (Cognate applications 10860, 9th May, 1951, and 14308, 16th June, 1951.) (712824.)

1530. General Electric Co., Ltd., Hewitt, W. H. L., and Simpson, A. I. F.—Apparatus housings. 21st January, 1952. (712825.) 1531. Gas-cooled electrical apparatus. 21st January, 1952. (712826.)

7822. British Thomson-Houston Co., Ltd.—Electric circuit breakers employing resistance switching. 4th April, 1951. (713074.)

9417/8. General Electric Co., Ltd.—Methods and apparatus for high-frequency dielectric heating. 8th April, 1952. (713076/7.)

9640. Mouchel & Partners, Ltd., L. G.—Distribution of water in water-cooling towers. 24th April, 1952. (712905.)

10424. Plessey Co., Ltd.—Transformers. 5th May, 1952. (713176.)

11809. British Thomson-Houston Co., Ltd.—Magnetic fluid devices. 21st May, 1951. (712908.)

15951. Telegraph Construction & Maintenance Co., Ltd.—Plastic welding device. 1st July, 1952. (713184.)

17335. Minister of Supply.—Control of electrodes in machines for vacuum arc melting, arc welding and the like. 21st July, 1952. (713005.)

18621. Oldham & Son, Ltd., and Martin, J. R.—Electric storage batteries. 21st July, 1952. (713187.)

18886. General Electric Co., Ltd., and Rycroft, J. L.—Thermal storage steam raisers. 11th August, 1952. (713008.)

20299. Marconi's Wireless Telegraph Co., Ltd.—Television and like transmitters. 1st May, 1952. (712914.)

20404. Cinema-Television, Ltd.—Cathode-ray tube circuits. 28th August, 1952. (713011.) 20408. Conductors for high voltages. 28th August, 1952. (713090.)

22349. Power Jets (Research & Development), Ltd.—Electrostatic precipitators. 15th September, 1952. (713022.)

23652. Simplex Electric Co., Ltd.—Electric fires. 10th October, 1952. (713017.)

24021. General Electric Co., Ltd., Curtis, T. J., and Page, B. H.—Electric motors. 3rd October, 1952. (713194.)

25023. Cossor, Ltd., A. C.—Combined transmitter and receiver arrangements. 27th October, 1952. (713093.)

25274. Siemens-Schuckertwerke Akt.-Ges.—Differential protective arrangements for current convertors. 29th October, 1951. (712921.)

25642. Diamond H Switches, Ltd.—Electrical energy regulators. 3rd November, 1952. (713026.)

25646. Cinema-Television, Ltd.—Time base, rectifier and like high voltage electrical circuits. 18th April, 1952. (713096.)

25841. Metropolitan-Vickers Electrical Co., Ltd.—Electric waveguides for accelerating charged particles. 15th August, 1952. (713198.)

26268. Heinrich, R. F.—Vertical electrostatic precipitators. 9th November, 1951. (713199.)

26457. General Electric Co., Ltd., and Williams, C. E.—Variable inductances. 9th September, 1952. (713028.)

27244. Babcock & Wilcox Tube Co.—Electric seam welding apparatus. 20th November, 1951. (713201.)

27732. Unimatic Corporation.—Electrical cable fittings for holding cables in engagement with junction boxes and other casings for electrical devices. 27th November, 1951. (713104.)

29505. General Electric Co., Ltd.—Electric condensers. 10th December, 1952. (Addition to 638857.) (712927.)

1952

95. Electrical Apparatus Co., Ltd.—Electrical control devices. 19th February, 1952. (Divided out of 712824.) (712850.)

269. Crompton Parkinson, Ltd., and Holophane, Ltd.—Electric lanterns. 4th December, 1952. (713115.)

3284. Telefonaktiebolaget L. M. Ericsson.—Electric route-setting equipment for railways. 7th February, 1952. (713037.)

5280. Metropolitan-Vickers Electrical Co., Ltd.—Multi-wave switches for wave-guide systems. 14th October, 1952. (713125.)

5555. Esmenard, E.—Electrical relay armatures. 3rd March, 1952. (713040.)

6182. Ohio Crankshaft Co.—Methods and apparatus for high-frequency induction heating. 10th March, 1952. (713041.)

6749. Siemens & Halske Akt.-Ges.—Contact arrangements for mechanisms for driving selectors, more particularly rotary selectors in telecommunication installations. 14th March, 1952. (712935.)

6837. British Thomson-Houston Co., Ltd.—Gravure printing method and apparatus therefor. 17th March, 1952. (712865.)

10473. Compagnie pour la Fabrication des Compteurs et Materiel d'Usines à Gaz.—Amplifying and measuring devices. 25th April, 1952. (713046.)

12519. Telefonaktiebolaget L. M. Ericsson.—Variable attenuation correcting electrical impedance network. 16th May, 1952. (713224.)

12604. British Thomson-Houston Co., Ltd.—Clothes washing machines. 19th May, 1952. (713225.)

13560. Mallory Metallurgical Products, Ltd.—Resistance welding electrodes. 18th March, 1953. (712943.)

14227. Steatit-Magnesia Akt.-Ges.—Multiple rotary switch. 5th June, 1952. (712946.)

15239. Time, Inc.—Electro-optical visual image correction systems. 17th June, 1952. (713137.)

15884. Philips Electrical Industries, Ltd.—Circuits for suppressing noise in wireless receivers. 24th June, 1952. (713231.)

16257. Standard Telephones & Cables, Ltd.—Voice-frequency signal receiver operated by two signal frequencies. 27th June, 1952. (712952.)

17315. General Electric Co.—Electric motor control systems. 9th July, 1952. (713235.)

17566. Standard Telephones & Cables, Ltd.—Selenium rectifiers. 11th July, 1952. (712954.)

18101. Philips Electrical Industries, Ltd.—Manufacture of dispenser cathodes. 17th July, 1952. (713140.)

18347. Tesla, Narodne Podnik.—Circuit arrangement for the neutralization of detrimental inter-electrode capacities. 21st July, 1952. (712955.)

19485. Compagnie pour la Fabrication des Compteurs et Materiel d'Usines à Gaz.—Television systems. 1st August, 1952. (712957.)

20568. Philips Electrical Industries, Ltd.—Hydraulic brakes, particularly for electric motors. 15th August, 1952. (712958.)

21453. Compagnie Générale de Télégraphie sans Fil.—Ultra-high-frequency wave transformers. 26th August, 1952. (712959.)

21951. Philips Electrical Industries, Ltd.—X-ray devices for depth therapy. 1st September, 1952. (713055.)

21984. Siemens & Halske Akt.-Ges.—Electric condensers. 1st September, 1952. (713058.)

24106. Soc. Francaise de l'Electro-Resistance, and Breton, R.—Wire-wound electric resistors coated with enamel and method of manufacturing same. 25th September, 1952. (712960.)

25731. British Thomson-Houston Co., Ltd.—Dynamo-electric machines. 14th October, 1953. (713152.)

27322. Chatham Electronics Corporation.—Anode structures. 30th October, 1952. (713157.)

29473. Philips Electrical Industries, Ltd.—Electric discharge tubes. 21st November, 1952. (712886.) 32614. Coil systems employing at least one high-frequency coil having a pre-magnetized rod-shaped core. 23rd December, 1952. (712967.)

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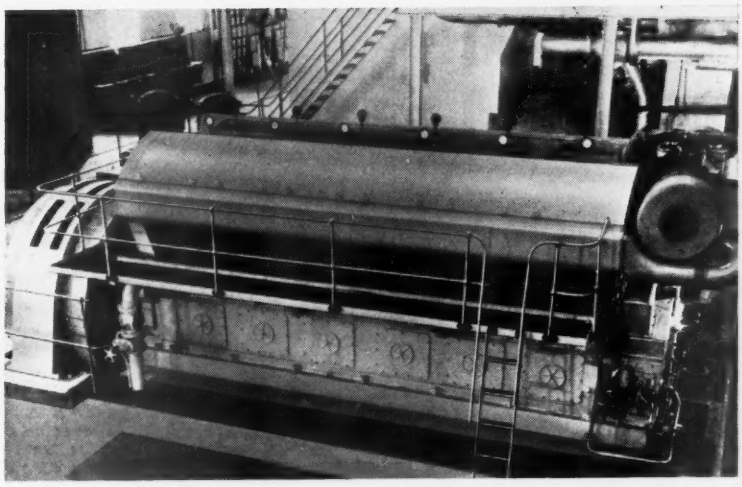
GENERATION AND DEVELOPMENT



Mirrlees 1,250 kW diesel generating set at Ijora power station, Lagos, Nigeria

Supply to Scottish Islands

To bring electricity to the island of Eriskay from South Uist in the Outer Hebrides the North of Scotland Hydro-Electric Board has laid a submarine cable between Saltavik, South Uist, and Rudha Ban on Eriskay. Electricity for the island will be provided from the Board's diesel generating station which is under construction at Daliburgh in South Uist. Survey work on the routes of the distribution lines on Eriskay has been completed. On South Uist, the construction of lines northwards from Daliburgh has begun. The contractors are James Scott & Co. (Electrical Engineers), Ltd., and the consulting engineers are Messrs. Merz & McLellan.

The Board has decided to provide a supply to the island of Uist in the extreme north of Shetland. It will be some time yet before the distribution work can start but a survey of the route of the lines will begin this summer. The charges for electricity will be at the Board's standard tariff for areas supplied by diesel power stations, and the same as in Lerwick.

Rural Experiment

The South Western Electricity Board is experimenting with new methods to speed up and reduce the cost of supplies to farms and other rural premises. At Backwell Hill, North Somerset, the Board was asked to provide additional supplies to a Post Office research station and an orphanage at the top of a hill, where there were also a farm and cottages without electricity. This necessitated the extension of an 11 kV main to the top of Backwell Hill, and in order to use the existing poles carrying the low voltage service line a new type of 3-core rubber insulated copper sheathed 11 kV aerial cable was made for the Board by British Insulated Callender's Cables, Ltd. A local farmer, Mr. F. T. Osmond, of Chelvey Farm, agreed to co-operate and from his farmyard the 1,300 yd of cable was run out by winch. The cable was attached to a wire hawser and pulled through pulley blocks, mounted on the poles, to span the wooded hillside. This experiment, the first of its kind in the country, was planned by the Board's chief engineer (Mr. G. O. McLean) and carried out by the Weston-super-Mare District under the supervision of the cable makers' engineers. It opens up new possibilities of cheapening the costs of rural extensions, and will also enable the engineers, when they have a major repair job on hand, to provide an alternative supply quickly and cheaply.

Resources of the Jordan

The Beirut correspondent of *The Times* reports that Mr. Eric Johnston, President Eisenhower's personal envoy in the Middle East, has arrived in Cairo to discuss with representatives of the countries concerned three rival plans for developing the resources of the River Jordan. Under the plan drawn up last year by the Tennessee Valley Authority on behalf of the United Nations, the water for irrigation would be divided between Israel (33 per cent) and the two Arab States of Jordan and Syria (67 per cent), giving no benefit to Lebanon. Provision is made for the construction of a 38,000 kW hydro-electric plant at Tel Hai in Israel and a further plant of 27,000 kW at Adasiya. A second plan drawn up by a technical committee of the Arab League proposes that the power plants should be sited at Maqarin and Adasiya. A third plan has just been submitted by the Israeli authorities.

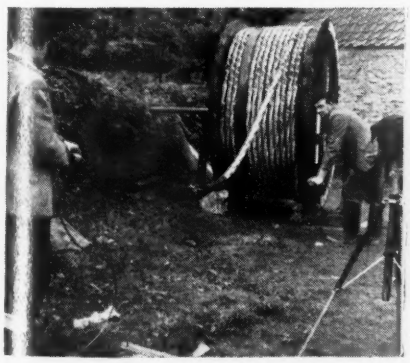
Nigerian Plant Extensions

For increasing the supply of electricity in its area the Electricity Corporation of Nigeria has in hand a programme of plant extensions in connection with which Mirrlees, Bickerton & Day, Ltd., have recently supplied two engines for installation in the Ijora "A" power station at Lagos. One of these engines is now in service and the other is in course of erection. The power station, which has an ambient temperature of 105 deg F with a relative humidity of about 95 per cent, already contains one 3,750 kW and two 5,000 kW turbo-alternators and the engines are situated between two of these.

The engines (Mirrlees KVS12 type, pressure-charged, with twelve cylinders in "V" form) are directly coupled to Brush alternators with a continuous rating of 1,250 kW. Gas oil costing 1s 5d a gallon in bulk is used, the fuel cost per kWh at from half load to overload being approximately 1d/kWh. A closed-system is employed for water cooling. A 2,000 gal fresh water tank is installed for both engines and the engine jacket water is cooled in a Serck heat exchanger with sea water as the coolant.

The next stage in Nigeria will be the

Erecting an 11 kV cable on existing low-voltage service line poles in North Somerset. (1) The cable being run out from the farmyard. (2) The cable is run through a pulley block. (3) As it is erected the cable is cleared from twisted tree stumps



commissioning of Ijora "B" power station which will comprise two 12,500 kW Brush Ljungstrom turbo-alternators manufactured by Brush Electrical Engineering Co., Ltd. Both this company and Mirrlees, Bickerton & Day, Ltd., are members of the Brush Group.

Transformer for Dunston

To transport a 75,000 kVA, ON/OFB, 132/66 kV three-phase transformer from the Avenue Works, Hollinwood, of Ferranti, Ltd., to Dunston power station (B.E.A. North Eastern Division) a new Wynn 200 ton trailer was brought into commission for the first time. The weight of the transformer was 125 tons and the total length of the convoy 146ft.

Output Increase in May

After a comparatively small increase in April, the May returns of the Ministry of Fuel and Power show a sharp rise in electricity generated. The total of 5,592 million was 736 million (15·2 per cent) more than in the corresponding month of last year, this being the highest monthly increase since 1951. As shown in the accompanying Table I, the average rate so far this year is now 10·8 per cent. At the end of May the total capacity of plant installed in stations of the British Electricity Authority and the North of Scotland Hydro-Electric Board was 19,263 MW, there having been a net addition of 55 MW during the month. New plant installed in B.E.A. stations comprised a 60 MW Metropolitan-Vickers set at Carrington, a 365,000 lb/hr Babcock & Wilcox boiler at Cliff Quay, a 230,000 lb/hr International Combustion boiler at Nechells, a Simon Carves unit of 360,000 lb/hr at Chadderton and a 300,000 lb/hr Yarrow unit at Roosecote.

Table II analyses the Electricity Board's sales during May. The national figures show an increase over May, 1953, of 14·8 per cent, but when corrected for weather conditions which were considerably colder than a year earlier and for the number of working days, which were fewer than last year, the increase is 9·6 per cent.

Shin-Caithness Transmission Lines

The Rt. Hon. James Stuart, M.P., Secretary of State for Scotland, has confirmed a scheme prepared by the North of Scotland Hydro-Electric Board which will connect the five generating stations to be built under the Board's Loch Shin project in Sutherland and will also extend the Board's Highland grid. The purpose of the scheme is to enable supplies of electricity from the Board's hydro-electric stations to be sent to Caithness. The scheme is estimated to cost £1,702,000.

Overhead transmission lines will run from the main generating station of the Loch Shin scheme at Inveran to the generating station at Ben Hee. Overhead and underground lines will connect this line with the other generating stations at Lairg and Cassley and the Garvault generating station will be connected to the station at Ben Hee. Transforming stations will be built at Inveran, Lairg, Cassley and Ben Hee. The extension of the Board's Highland grid will be from the main generating station at Inveran to Mybster, south of Halkirk in Caithness, where a transforming station will be erected. All the objections lodged against the scheme have been withdrawn. A White Paper on the scheme has been published to-day and is available from H.M. Stationery Office.

Power Station Steam Conditions

We summarized Lord Citrine's remarks at a meeting of B.E.A. and Area Board members and staff at Eastbourne in our last issue (p. 1139). In the course of this Lord Citrine referred to the 200 MW sets and 1,400,000 lb/hr boilers to be installed in the new High Harnham station and said that steam conditions would be 2,350 lb/sq in and 1,050 deg F with reheat to 1,000 deg F. Inadvertently we gave these temperatures as Centigrade.

Geothermal Power Station

New Zealand's Minister of Works, Mr. S. Goosman, has announced that his department is "almost ready to go" on the erection of a geothermal steam electric power station. His statement followed an inspection by Ministers and members of Parliament of bores at Wairakei, near Lake Taupo, in the centre of the North Island, which are discharging superheated steam hundreds of feet into the air. The latest reports show that the steam from the Wairakei bores is cleaner and of a higher temperature than that which has proved successful at Lardarello, in Italy. Steam from one of the bores gave a reading of 265 deg C. The Minister said that practical results of the high quality of the steam would be that equipment of the type already in use overseas could probably be imported and installed with only minor modifications.

Street Lighting

A scheme approved by RUTHERGLEN Town Council for converting the street lighting from gas to electricity will, it is estimated, save £1,400 a year. The total cost will be over £30,000.

CHICHESTER City Council is recommended to invite tenders for improving the lighting in Oving Road at an estimated cost of £2,000.

MIDDLETON Corporation is applying for consent to borrow £2,479 for converting the street lighting in Hollin Lane from gas to electricity.

MERTON & MORDEN U.D.C. has approved the installation of sodium lighting in Epsom Road and London Road, Morden.

EXETER Lighting and Cleansing Committee has received consent to borrow £12,878 for the remainder of the main street lighting. An order for the lamp columns has been placed with the Staverton Ironworks Co., Ltd., and the Committee has recommended the acceptance of the tender of the General Electric Co., Ltd. (£5,069) for 400 W mercury vapour prismatic lanterns, including chokes and capacitors, and the erection of the concrete columns.

EAST ELLOE (Lincs.) R.D.C. is to convert part of the street lighting at Long Sutton from gas to electricity.

Improved lighting by 140 W sodium lamps, is to be provided from the centre of SOWERBY BRIDGE along West Street and Rochdale Road to the Ripponden boundary.

TABLE I.—ELECTRICITY GENERATED AND PLANT INSTALLED*

	Fuel consumed Thousand tons			kWh generated Millions			kWh sent out Millions	Installed capacity (m.c.r.) MW
	Coal	Coke and Breeze	Oil	Steam	Water power	Total†		
British Electricity Authority ...	2,945	92	8·3	5,456	27	5,489	5,145	18,697
N. of Scotland H.E.B.	21	1	1·1	33	65	103	101	566
Total for May, 1954	2,966	93	9·4	5,489	92	5,592	5,246	19,263
Corres. total for May, 1953 ...	2,642	65	5·4	4,770	75	4,856	4,560	17,742
Increase or decrease, per cent ...	+12·3	+43·1	+74·1	+15·1	+22·7	+15·2	+15·0	+8·6
Total to date (5 months), 1954...	16,882	512	65·4	30,927	617	31,608	29,743	
Total for corres. 5 months of 1953	15,608	409	35·5	28,000	458	28,528	26,864	
Increase or decrease, per cent ...	+8·2	+25·2	+84·2	+10·5	+34·7	+10·8	+10·7	

* By the British Electricity Authority and the North of Scotland Hydro-Electric Board.
† The total includes 7 million kWh generated by oil engines and 4 million by waste heat plants in May, 1954.

TABLE II.—ELECTRICITY SENT OUT BY AREA BOARDS FOR THEIR CONSUMERS

Area Board	Totals for May (million kWh)			Twelve Months Totals Ended 31st May (million kWh)		
	1953	1954	Inc. or Dec. %	1953	1954	Inc. or Dec. %
London	387·3	456·2	+ 17·8	5,614·9	5,818·0	+ 3·6
South Eastern	236·6	274·6	+ 16·1	3,252·3	3,470·4	+ 6·7
Southern	283·9	323·9	+ 14·1	3,806·4	4,065·5	+ 6·8
South Western	138·0	168·2	+ 21·9	1,828·5	2,009·4	+ 9·9
Eastern	393·9	447·5	+ 13·6	5,286·1	5,621·4	+ 6·3
East Midlands*	346·6	389·0	+ 12·2	4,513·4	4,781·1	+ 5·9
Midlands*	461·5	531·0	+ 15·1	6,021·8	6,493·7	+ 6·9
South Wales*	263·8	325·1	+ 23·2	3,326·5	3,708·1	+ 11·4
Merseyside and N. Wales* ...	259·9	304·1	+ 17·0	3,361·0	3,628·7	+ 8·0
Yorkshire*	449·0	514·1	+ 14·5	5,878·5	6,280·3	+ 6·8
North Eastern*	279·1	305·6	+ 9·5	3,519·8	3,746·0	+ 6·4
North Western*	500·0	561·8	+ 12·3	6,426·4	7,016·1	+ 9·2
South East Scotland	93·3	106·1	+ 13·7	1,251·1	1,357·2	+ 8·5
South West Scotland* ...	230·0	252·3	+ 9·7	3,033·5	3,221·9	+ 6·2
Total all Area Boards ...	4,322·9	4,959·5	+ 14·7	57,120·2	61,163·8	+ 7·1
Direct Supplies by Central Authority	77·2	93·7	+ 21·4	803·6	1,049·3	+ 30·6
Grand Total	4,400·1	5,053·2	+ 14·8	57,923·8	62,213·1	+ 7·4
Mainly Industrial Areas* ...	2,789·9	3,183·0	+ 14·1	36,080·9	38,821·9	+ 7·6
Mainly Non-Industrial Areas	1,533·0	1,776·5	+ 15·9	21,039·3	22,341·9	+ 6·2
Total Number of Effective Working Days	27·76	28·27				

* Those in which industrial consumers took over 50% of the total sales in the preceding financial year.

NEW ELECTRICAL EQUIPMENT

Transistors

A new germanium transistor, type GET2, is now available from the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2, to home constructors as well as equipment manufacturers. It is a low voltage pattern of the GET1, which is still available only to equipment manufacturers, and will provide home constructors with a readily obtainable transistor for experimental work.

The connections, dimensions and operating precautions which apply to the GET1 transistor also apply to the GET2. The ratings and characteristics of the two types are different, however. Since low voltage operation is the special feature of the GET2, the knee of the curve is important, and this is checked at I_c=5·5 mA, I_e=3·0 mA, instead of at I_c=2·0 mA, I_e=1·0 mA, as with the GET1. The collector current at I_e=0 is measured at 10 V instead of 30 V. To ensure good gain the minimum limit for alpha is 2·5 instead of 2·0. Maximum collector voltage, V_c, is −30 V; the maximum collector current, I_c, is 15 mA d.c.; the maximum operating temperature, T_{op}, is 35 deg C; and the maximum collector dissipation, p_c, is 75 mW. The new transistors are listed at 37s 6d each, but the price to equipment makers is 21s net.

Earth Borer and Hoist

The Lennox-Lomax earth borer, power winch and auto-hoist, designed for attachment to the "Fordson Major" diesel tractor, is intended for dealing with all sizes of electricity, telegraph, etc., poles. It bores holes of 30in diameter by 6ft 6in deep in ordinary soil in 4–5 minutes. The heavy roller chain drive and hydraulic power feed are controlled from one position alongside the drill. The power winch for conductor tensioning, cable pulling, etc., is driven through a heavy roller chain at two speeds, 37½ ft/min and 75 ft/min. The auto-hoist will lift a load of 30 cwt to a height of 12ft or 15 cwt to a height of 19ft. The unit is manufactured by the LENNOX MOTOR CO., Southsea.

Lennox-Lomax earth borer, power winch and auto-hoist

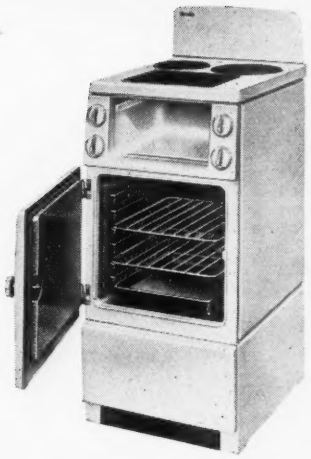
Cabinet Cooker

A new low-priced electric cooker announced by the SIMPLEX ELECTRIC CO., LTD., Creda Works, Blythe Bridge, Staffs, has a stylish appearance and includes facilities not usually regarded as part of standard equipment. The "Creda Star" cooker is available in two models, the 305 and the 310, which can be supplied either on a plinth or on legs, the only difference being that the 310 includes a 6½in boiling plate as well as an 8in plate and a grill boiler, the loadings being 1 kW, 2 kW and 2 kW respectively.

The cooker possesses a very large oven (2,540 cu in). This and the 8in plate are auto-controlled as standard, and all controls are at waist height. The grill boiler has been specially shaped to retain heat and there is plenty of room for plate warming. Both the grill pan and the large oven meat pan are vitreous enamelled.

The oven is insulated with glass fibre wool wrapped round with aluminium foil. The oven also includes the "Creda" patented system of heat ventilation, 2,200 W tubular sheathed elements and six-position non-tilt shelves. The oven control knob glows while the oven is switched on.

Model 310 is available with an extended hob, complete with towel rails, at slight extra cost, and the 305 can easily be converted by the fixing of a socket block, switch and wiring, and exchanging the hob. The hob, splash plate, front frame, grill chamber, oven door and front of plinth are all finished in acid-resisting porcelain enamel; the oven interior is finished in a light mottled vitreous enamel; side panels and plinth sides or legs are bonderized and stove enamelled.



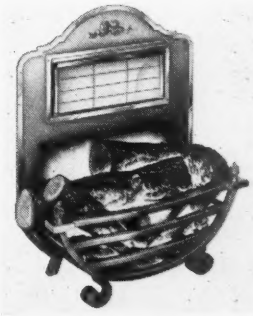
"Creda Star" cooker model 310

The standard finish is in two-tone ivory (plinth models) and grey and white (leg models). All other parts are rust-proofed and bright parts are heavily plated.

The overall dimensions are 36in high (43¼in to splash plate) by 18⅛in wide (model 310, 24⅛in) by 23¼in deep. The retail prices are £25 10s (305) and £27 10s (310).

Log-Effect Fire

The latest addition to the range of electric fires manufactured by BERRY'S ELECTRIC LTD., Touchbutton House, Newman Street, London, W.1, is the No. 110 "Alderberry." Designed for fitting over the opening left by a coal grate, this new fire incorporates an imitation log basket and is equipped with a recessed heat reflector. Loading is 2 kW and full heat control is provided by moving a stump on one of the logs. The fire is in armour bright finish with satin brass enrichments.



No. 110 "Alderberry" imitation log fire

The overall dimensions are 19in wide by 25in high and 9in deep. The outer cover of the reflector, 21in by 12⅜in, projects 6in backwards behind the fire, bringing the overall depth to 15in. Provided with 6ft of three-core flex, the price is £19 10s, plus £7 2s 7d purchase tax in the United Kingdom.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Antrim.—14th July. County Education Committee. Electrical installation at new intermediate school, Larne. Specification, etc., from A. N. Irens, consulting engineer, 58, Howard Street, Belfast.

Australia. — BRISBANE. — 15th September. State Electricity Commission of Queensland. Steam and feed piping for power stations of the Capricornia and Townsville Regional Electricity Boards. (Ten/9618.)*

Belfast.—5th July. Northern Ireland Housing Trust. Electrical installations in a shop, a house and five flats at Comber, Co. Down. Specifications, etc., from the offices of the Trust, 12, Hope Street.

Belgium. — BRUSSELS. — 22nd July. N.A.T.O. Installation of electric power and lighting in a workshop hangar at Melsbroek aerodrome. (E.S.B. 15296/54. Ten/9655.)*

Camberwell. — 12th July. — Borough Council. Two pedestrian controlled street orderly electric trucks. Forms from the borough engineer, Town Hall, S.E.5.

Durham.—30th June. County Education Committee. Electrical installation at Houghton-le-Spring Grammar School and Blaydon West County School. (See this issue.)

Formosa.—TAIPEI—2nd July. Taiwan Power Co. Aluminium cable and electrical equipment. (E.S.B. 14619/54. Ten/9566.)* 22nd July. Central Trust of China. Electrical testing equipment. (E.S.B. 15365/54. Ten/9656.)*

Ilford.—28th July. Corporation. Equipment for a sewage pumping station. (See this issue.)

India.—MADRAS.—15th July. Government of Madras. Lighting installation at the Kancheepuram substation. (Ten/9604.)*

Jordan.—21st July. Ministry of National Economy. Complete electric power plant for the Vegetable Oil Industries Company at Nablus. (E.S.B. 15193/54. Ten/9650.)*

London. — WANDSWORTH. — 7th July. Borough Council. Street lighting and sodium lamps. (See this issue.)

Lydney.—31st July. R.D.C. Two 150 gal/min automatic pumping sets for Aylburton sewerage scheme. Forms from J. D. & D. M. Watson, engineers, 18, Queen Anne's Gate, Westminster, S.W.1.

North of Scotland.—20th September. Hydro-Electric Board. Boilers, coal and ash handling plant, etc., for Carolina Port generating station, Dundee. (See this issue.)

Southend-on-Sea.—5th July. Town Council. Electrical installation at Bournemouth Park Junior and Infants' Schools. (See this issue.)

19th July. Electrical installation at West Leigh Primary School. (See this issue.)

Southern Rhodesia.—2nd July. Government, Central Mechanical Equipment Department. Motor electrical accessories. (E.S.B. 14973/54. Ten/9649.)* BULAWAYO. — 7th July. Electricity Department. On-load tap changing equipment. (E.S.B. 14827/54. Ten/9596.)*

Stamford.—6th July. Corporation. Fifty electric cookers. (See this issue.)

United States. — DENVER. — 8th July. United States Bureau of Reclamation. One 10,000 kVA auto-transformer and spares for Lovell substation, Missouri River Basin Project. (Ten/9648.)*

Wombwell.—5th July. U.D.C. Wiring of 265 dwellings on various sites. Forms from C. Knowles, surveyor, Town Hall.

* Specifications may be inspected at the Export Services Branch, Board of Trade, Lacon House, Theobald's Road, London, W.C.1 (Chancery 4411; extension 769).

ORDERS PLACED

Chorley (Lancs.).—R.D.C. Trunk road A.49 street lighting installation.—Cohen Bros. (Electrical), Ltd.

Douglas (I. of M.).—Street Lighting Committee. Recommended. Street lighting standards and fittings (£5,342).—Siemens Electric Lamps & Supplies.

South Shields.—Education Committee. Electrical installations in connection with additions to South Shields Grammar and Technical School for Girls (£1,392).—A. Robertson.

Warrington. R.D.C. Class "A" lighting installations, roads A.57 and A.574, utilizing 143 "S.O. Fifty" lanterns (£11,337).—Metropolitan-Vickers.

WORK IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Ardrossan.—Houses (50), Kirkhall site; Scottish Special Housing Association, Ltd., 15/21, Palmerston Place, Edinburgh, 12.

Birkenhead.—Licensed premises, Bromborough Road; staff architect, Birkenhead Brewery Co., Ltd., 73, Oxton Road.

Birmingham.—Ward unit at Chelmsley Hospital, Marston Green; regional architect, 10, Augustus Road.

Boldon.—Office block and laboratory for Insulating Products, Ltd.; J. M. Angus, architect, 21, Lovaine Place, Newcastle-on-Tyne.

Bromsgrove.—High school (£200,000); Yorke, Rosenberg & Mardall, architects, 2, Hyde Park Place, London, W.2.

Cardiff.—Bank premises, Queen Street; Barclays Bank, Ltd., 54, Lombard Street, London, E.C.3.

Chaddesden.—Penguin Hotel; T. H. Thorpe & Partners, architects, 41, Friar Gate, Derby.

Croydon.—Factory and offices; Harringtons (London), Ltd., baby goods manufacturers, 329, Brighton Road, South Croydon.

Durham.—Fire station at Bishop Auckland (£34,000) and 25 family group houses (costing £5,500 each); county architect, Court Lane, Durham.

Eccles.—Additions to works; W. C. Evans & Co., Ltd., manufacturing chemists, Chadwick Road.

Hastings.—R.C. primary school; Hudson & Hammond, architects, 28, Buckingham Street, London, W.C.2.

Hatfield.—St. Michael's and All Angels' Church, Birchwood; N. F. Cachemaille-Day, architect, 1, Port Hill, Hertford.

Hebburn-on-Tyne.—Houses (72), Monkton Lane, and houses and flats in the Carr Street area; U.D.C. surveyor.

Herts.—Secondary technical school in Bushey Hall Road, Bushey (£248,900), secondary modern school at Thorley Road, Bishops Stortford (£173,320), and secondary modern school in Travellers Lane, Hatfield (£125,187); county architect, County Hall, Hertford.

Hornchurch.—Ward block for St. George's Hospital; Evans, Thompson & Whitehead, architects, 5, High Street, Romford.

Hull.—Transport depot, with warehouse and offices; Reader Bros., Ltd., 31, Blackfriargate.

Aged persons' hostel, Holderness Road; city architect.

Kerridge.—Factory; Eric Britton & Co., Ltd., bias bindings and smallware manufacturers, Ingersley Vale Works, Bollington.

Leicester. — Old people's home, Eyres Monsell estate (£40,988); city architect.

Lincoln.—Flats and suite of offices in redevelopment area, Clasketgate/Flaxengate; city architect, Stamp End.

London.—Block of offices, Albert Embankment; National Dock Labour Board, 9, Upper Brook Street, London, W.1.

HAYMARKET.—Reconstruction of Comedy Theatre, Panton Street; Cecil Masey and Alister G. MacDonald, architects, 10–13, Bedford Street, W.C.2.

Mansfield.—Church of St. Mary at Ladybrook estate; N. M. Lane, architect, 38a, Leeming Street.

Middlesbrough.—Old persons' hostel at Thorntree (£36,000); Pearson & Son, builders, Borough Road West.

Conversion of Trinity Hall into civic restaurant (£20,000); J. A. Kenyon, borough engineer.

Accident wing at the General Hospital for Newcastle Hospital Board, "Dunira," Osborne Road, Newcastle-on-Tyne; chief architect.

Two 40-bed villas at St. Luke's Hospital for Newcastle Hospital Board (£50,000); John McCreton, Ltd., builders, North Ormesby, Middlesbrough.

Morden.—Crematorium; Sir Guy Dawber, Wilson & Fox, architects, 122, Wigmore Street, W.1.

Newcastle-on-Tyne.—Seven-storey extensions to Rutherford College of Technology (£350,000); city architect. 18, Cloth Market.

Improvements to Newcastle Eye Infirmary (£30,000), additions to Middlesbrough General Hospital, and extensions to operating theatre suite at West Hartlepool General Hospital; chief architect, Newcastle Hospital Board, Osborne Road.

Newport (Mon.).—Newport and Monmouthshire Technical College; Sir Percy Thomas, architect, 10, Cathedral Road, Cardiff.

Norwich.—Additional villas at Little Plumstead Hall Hospital; East Anglian Regional Hospital Board, 33, Parkside, Cambridge.

Portmadoc.—Housing estate at Morfa Bychan; Lindsay Bullivant, architect, 10½, Bristol Road, Birmingham, 5.

Rugby.—Adaptation of Fawsley House, Hillmorton Road, as an aged persons' home; county architect, Warwick.

Salford.—Eight-storey flats at Liverpool Street; borough engineer.

Stockton-on-Tees. — Reconstruction of cattle market (£14,000); borough architect, 28, The Square.

Stourbridge.—Flats (48), Norton estate; borough surveyor.

Torquay.—Business premises at 66–70, Union Street; Littlewoods Mail Order Stores, Ltd., Waterloo Buildings, Cases Street, Liverpool.

Whitehaven.—Children's ward unit at Whitehaven and West Cumberland Hospital for Newcastle Hospital Board, 1, Lonsdale Street, Carlisle.

Worthing.—Bungalows (70), off Palatine Road; Haywards (Brighton), Ltd., 4. Bartholomews, Brighton.

Rebuilding showrooms; Caffyns, Ltd., motor engineers, Chapel Road.

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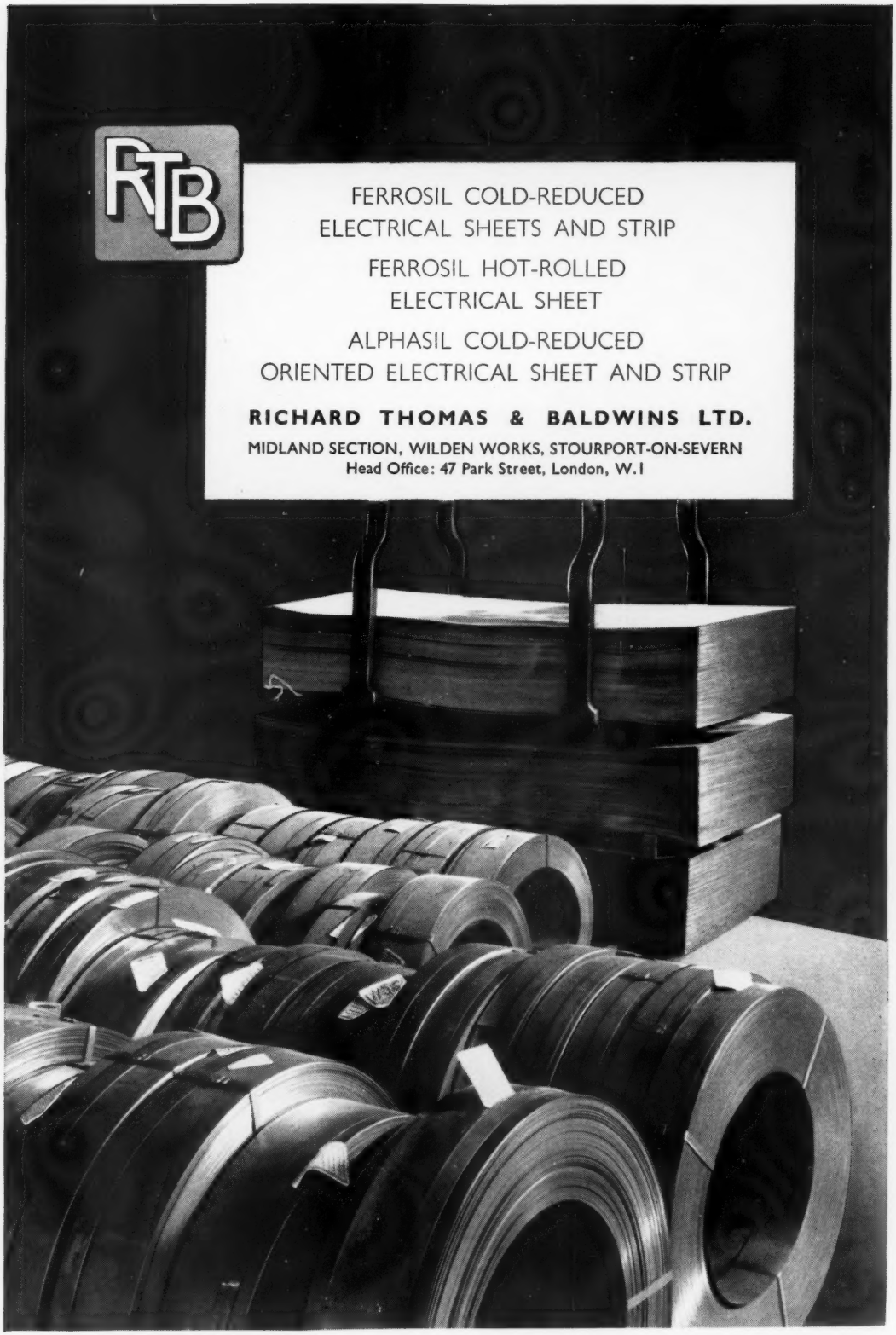
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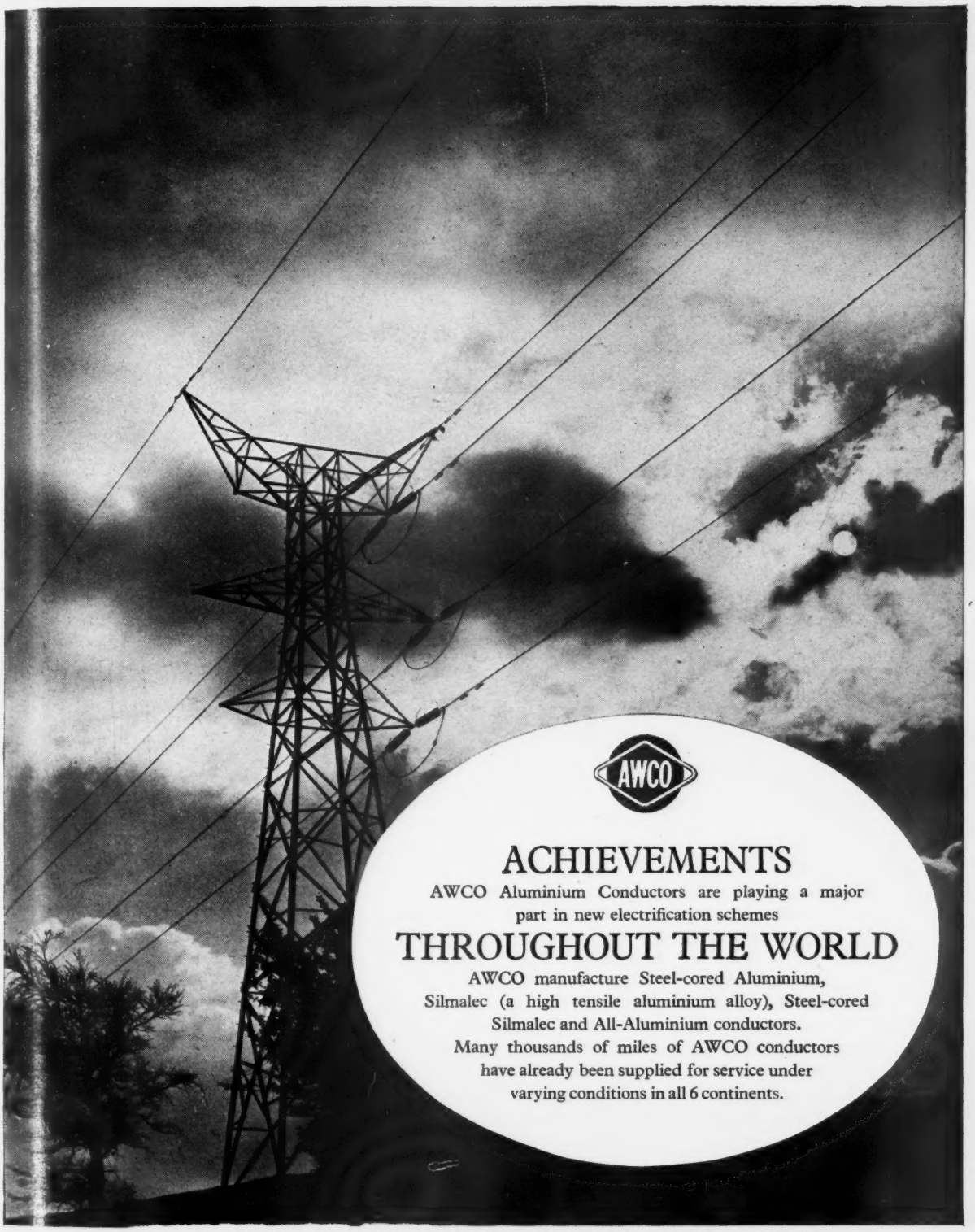
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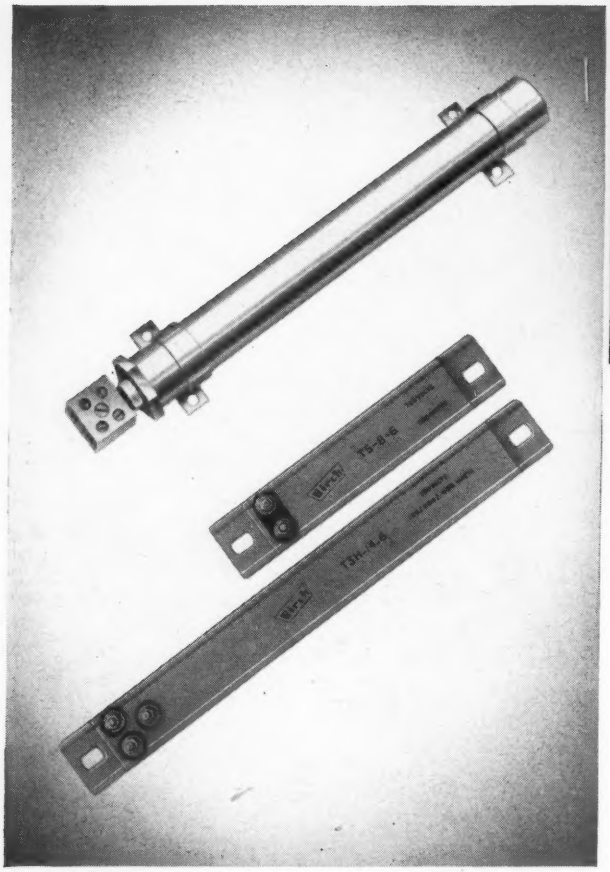

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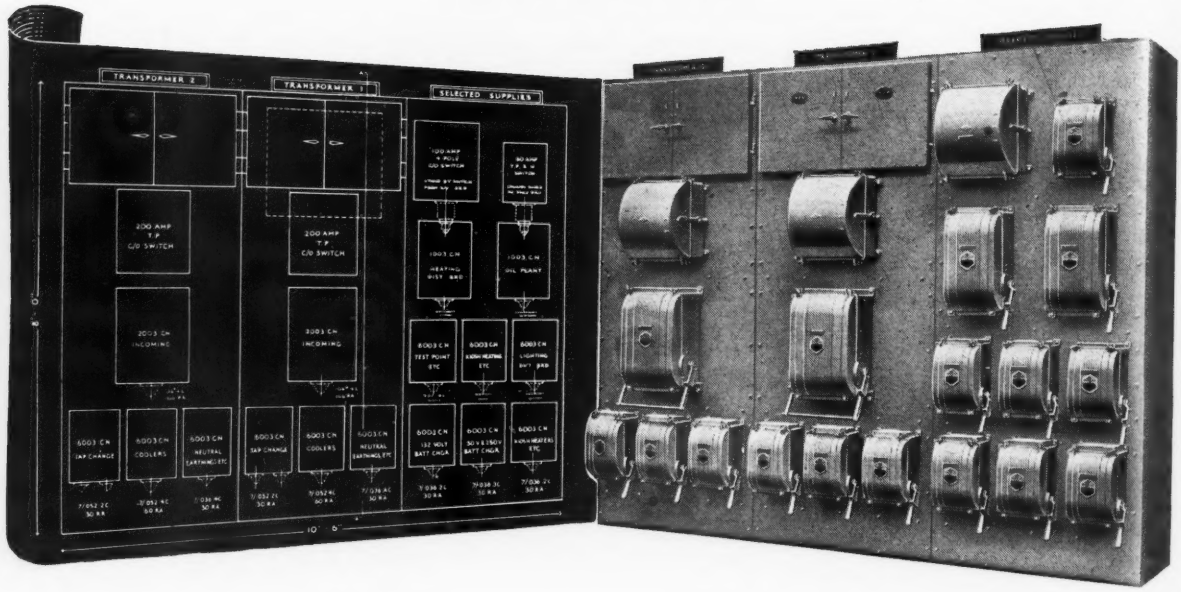

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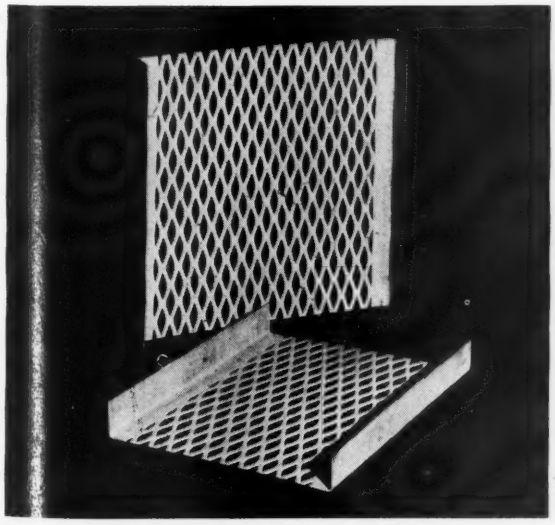
What is Expanded Metal?

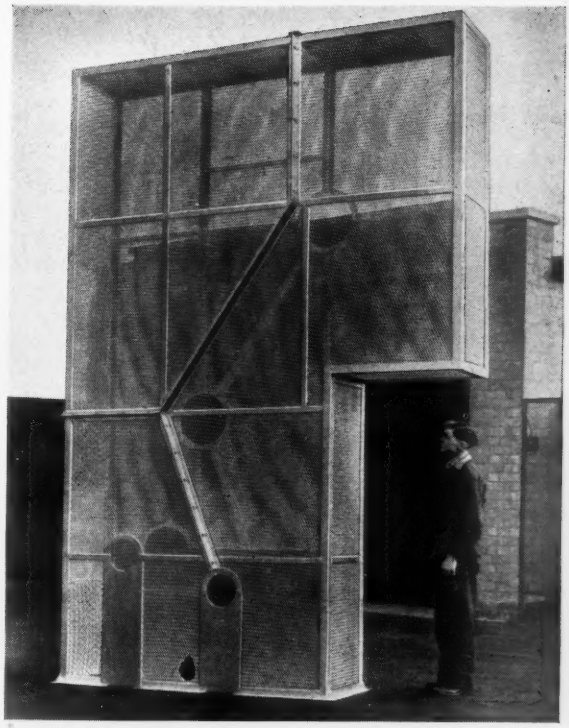
Expanded metal is made from a solid sheet of rolled sheet metal—steel, stainless steel, aluminium, brass or copper. It is cut and expanded without any waste of material into a network of diamond shaped meshes. The finished meshwork is strong and durable; it is easy to work, weld and shape; it has a naturally decorative appearance and is suitable for most of the available finishing processes.

Two New Types

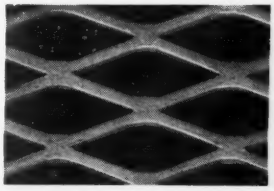
The two new basic ranges of expanded metal which are now on the market are — Flattened and Safe-mesh "Expamet". The first, Flattened "Expamet", is made by brushing and pressure-rolling the strands and junctions of Expanded Metal, so as to obtain a flat, smooth and level surface. The other, Safe-mesh "Expamet", is a range of meshes which have been brushed to remove all burrs and rough edges.



Cable trays *made from Flattened "Expamet".*



Machinery Guards *Machinery guards are one of the many uses for Safe-mesh "Expamet". The above were made by the City Sheet Metal Works, Ltd., Leicester.*



Flattened "Expamet" *The above illustration shows an example of Flattened "Expamet". This is made in thirteen different weights and mesh sizes from 5/32" to 1¼" (shortway of mesh).*

Safe-Mesh "Expamet" *Pictured above is Safe-Mesh "Expamet" which is produced in eight standard weights, and in mesh sizes from ¼" to 1½" (shortway of mesh).*

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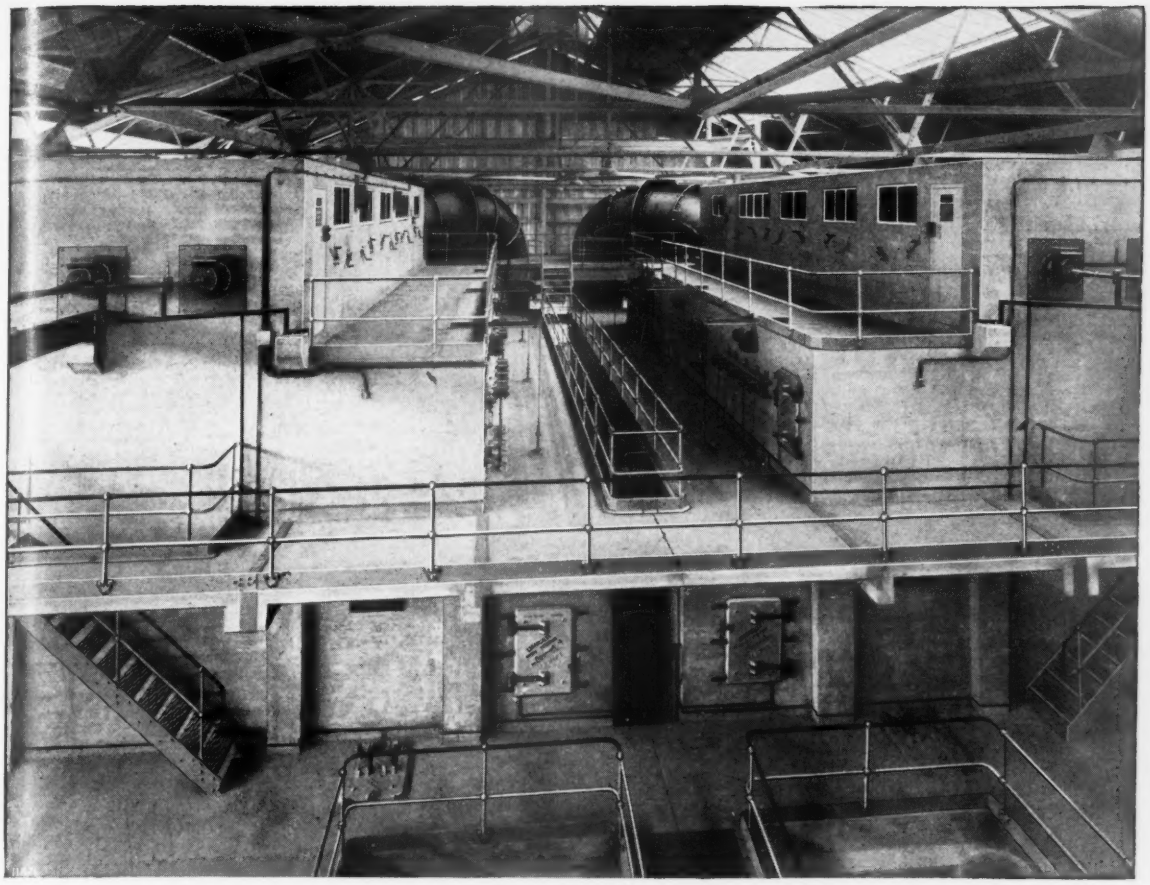

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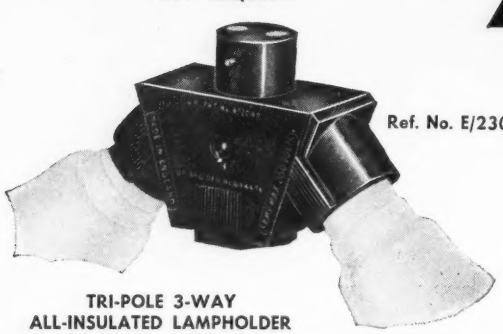

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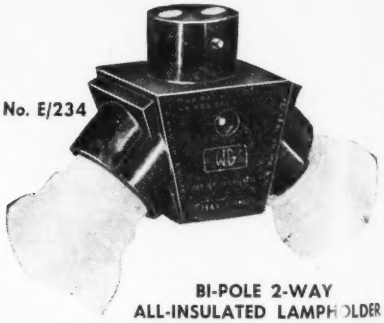

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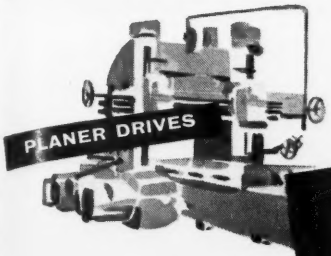

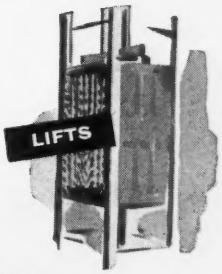

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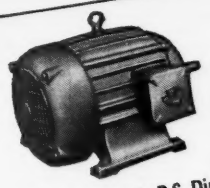

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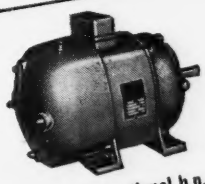
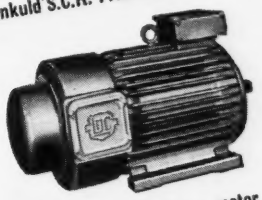
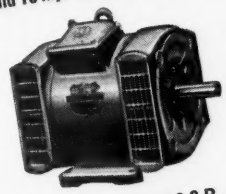
'Fankuld' S.C.R. 20 h.p. motor



'Fankuld' S.C.R. Fractional h.p. motor

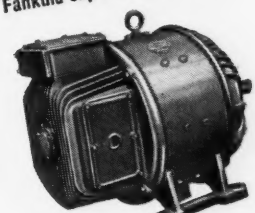


'Fankuld' Slip Ring 20 h.p. motor

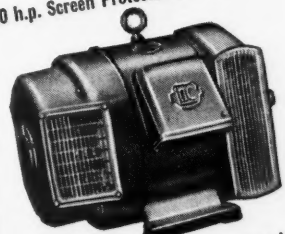


30 h.p. Screen Protected S.C.R. motor

'Tandem' Lift motor



D.C. Gasworks 20 h.p. motor



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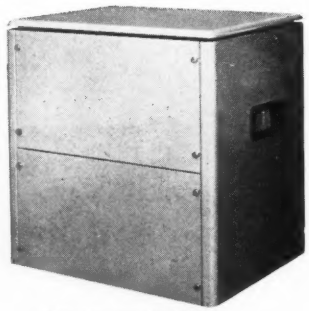

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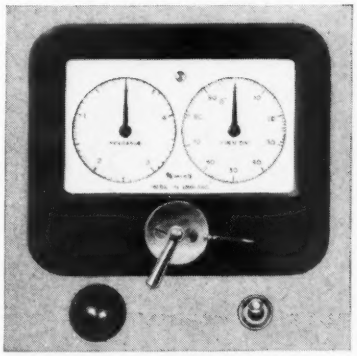
Conversion equipment supplied separately for modernising existing conventional test equipment.



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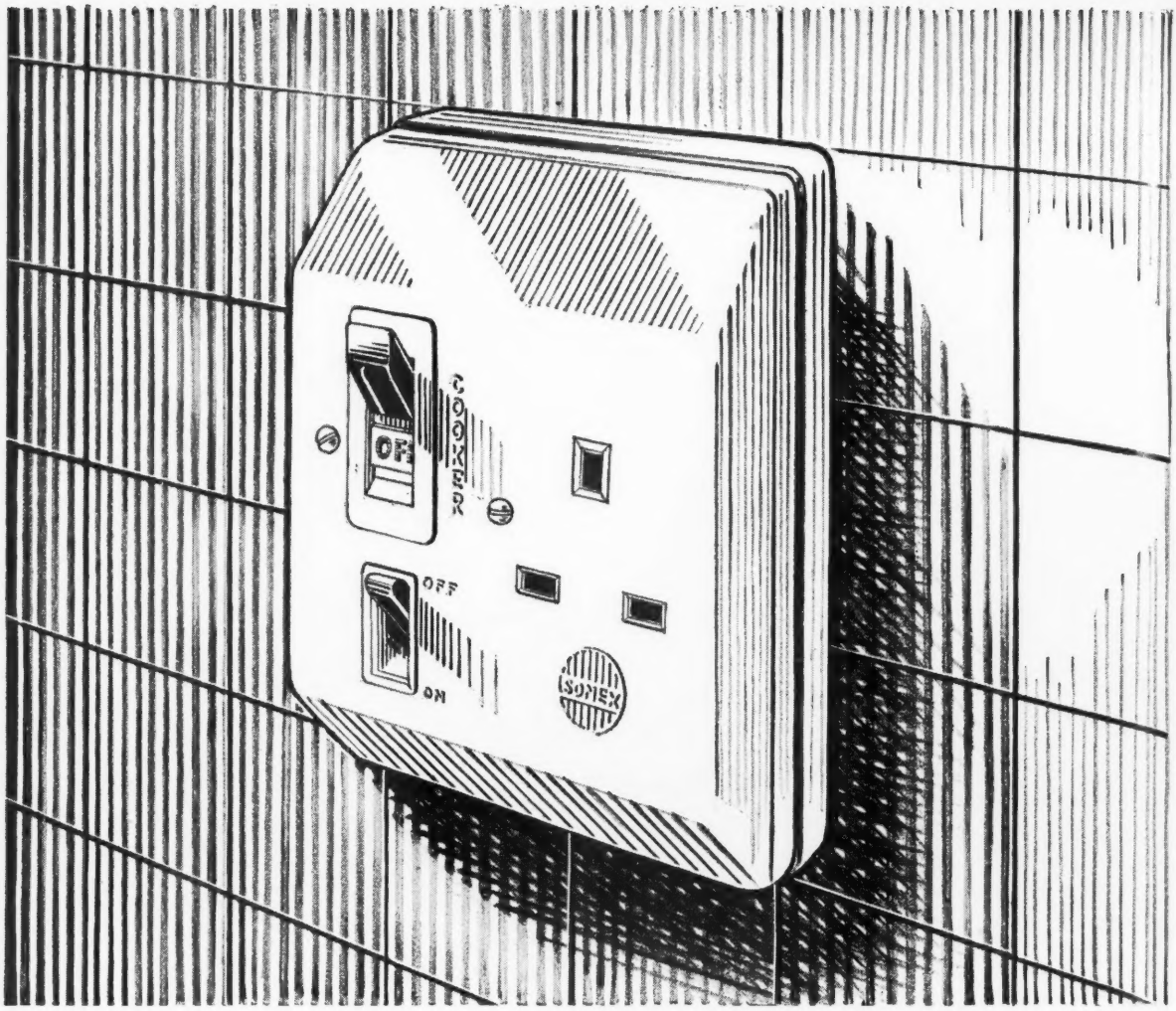

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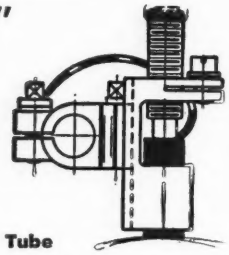

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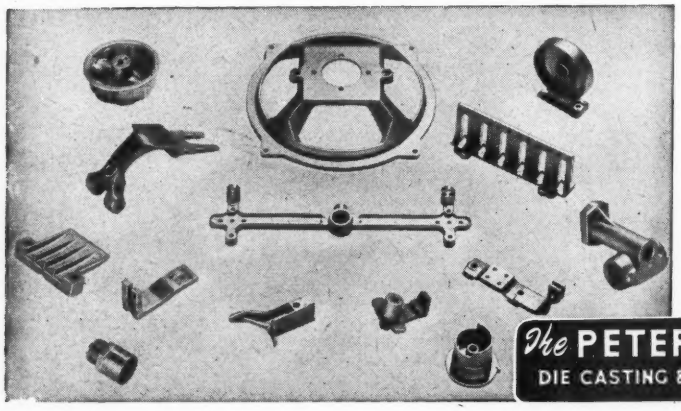

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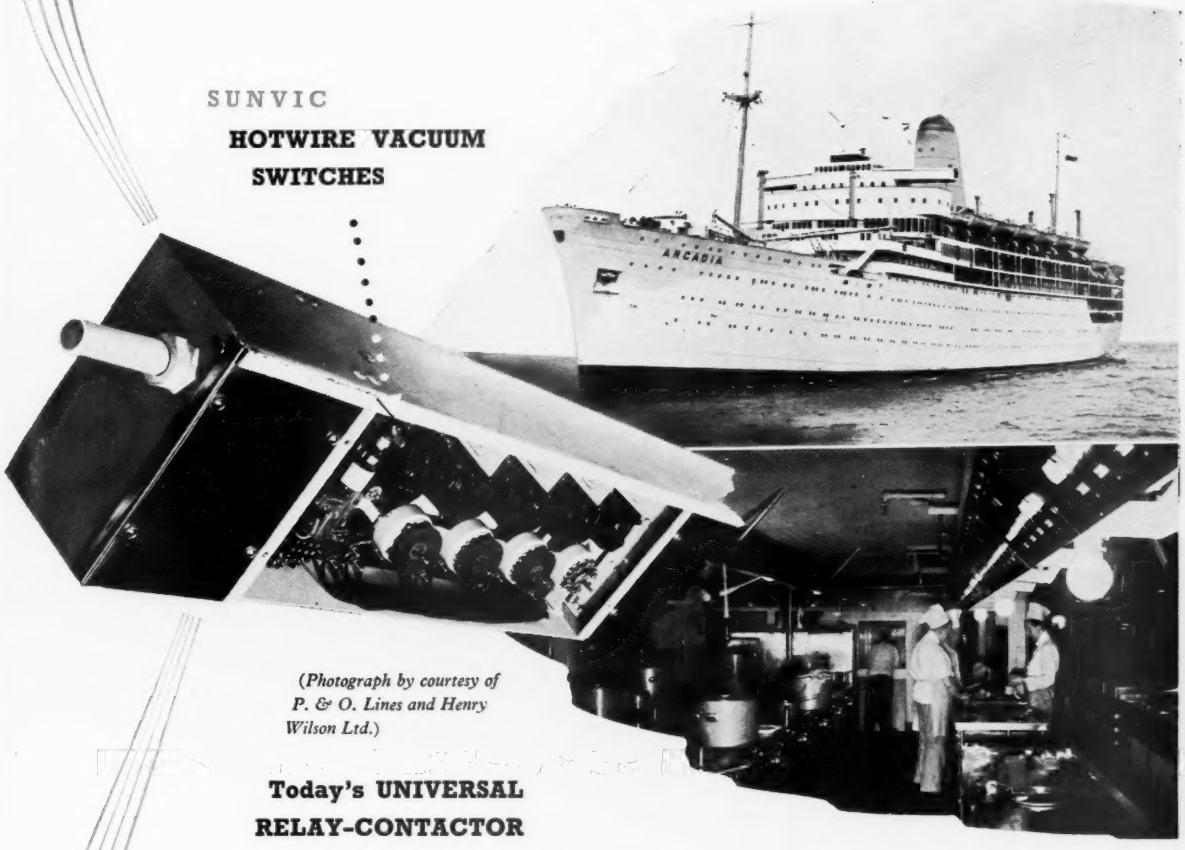

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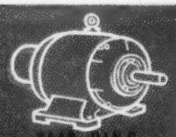
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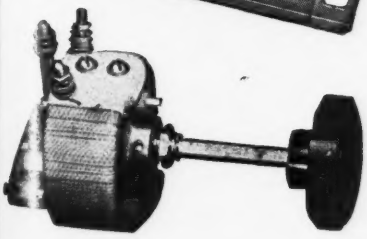

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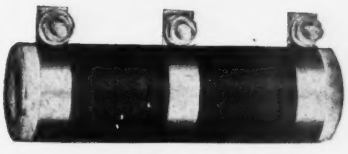

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KEY

REGD. TRADE MARK

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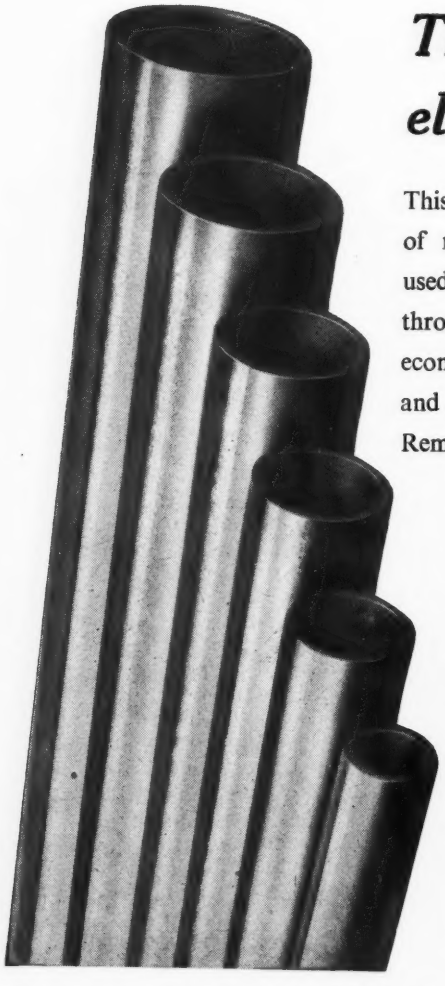
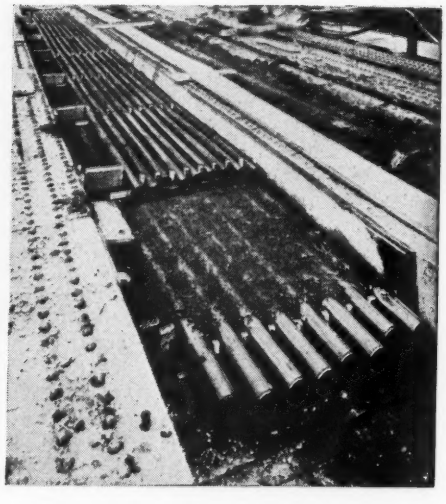


The Key to efficient electrical installations

This non-metallic, pitch impregnated material—the result of 50 years of research and development is now being more and more widely used for the protection of electrical cables in all types of installation throughout the world. Key Fibre Conduit is easy to handle, economical in cost and eliminates any electrolytic action on the cable and for these reasons alone, it is recognised as ideal for the purpose. Remember too, the lightweight character of the material, and that bends present no difficulty. We will be happy to give technical advice and assistance and make quotations for quantities of materials required for installations.



Key Fibre Conduit is now available in two wall thicknesses—one for laying in concrete and the other for laying direct in the ground.

The illustration on the left shows Key Fibre Conduit laid on a bridge by Westminster Electric Supply Corporation Ltd.—45 years ago.

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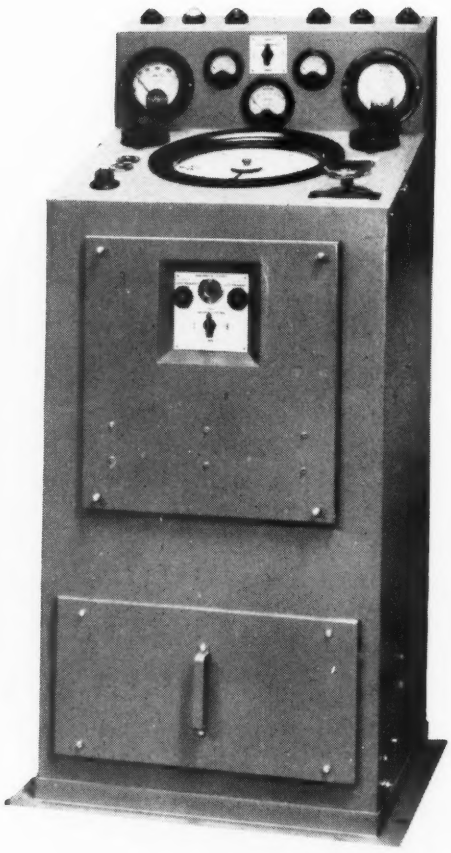

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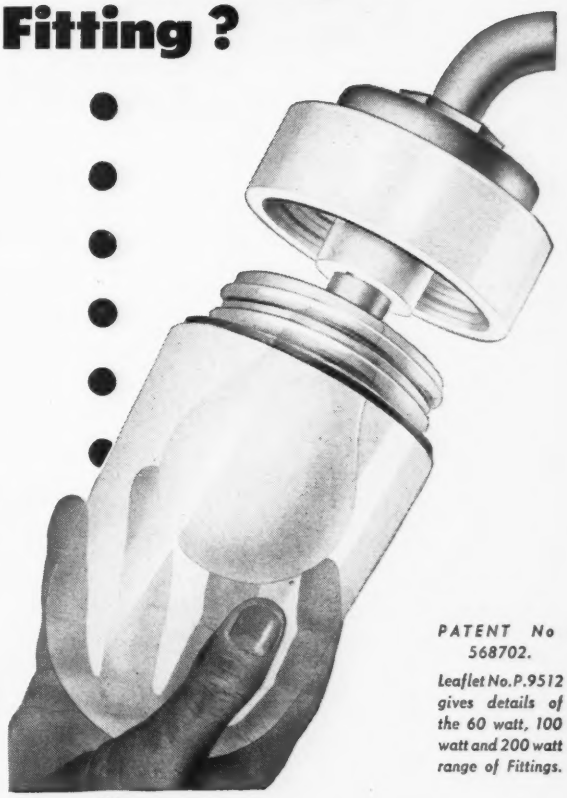

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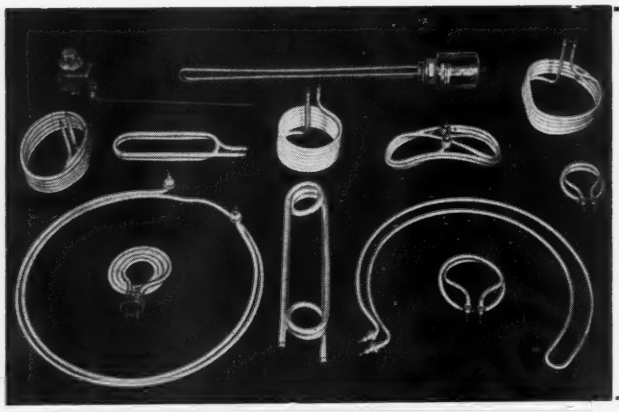

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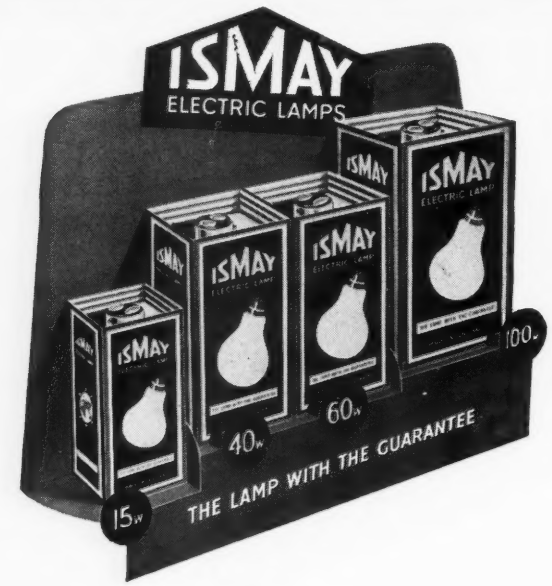

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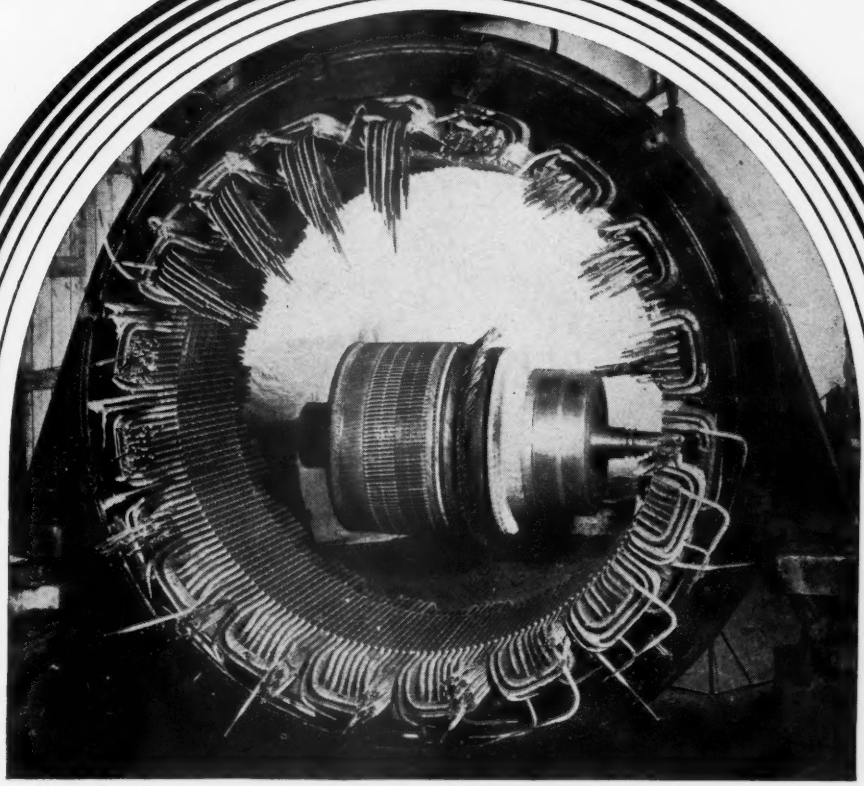

Variety. Collins' comprehensive experience ensures there is always at least one interesting job going through their works. Here is the stator of a 1250 H.P., 6,600 V., 246 r.p.m. English Electric Motor undergoing complete rewind. In the background is an Armature from a 250 H.P. B.T.H. C.H.T. variable speed motor.

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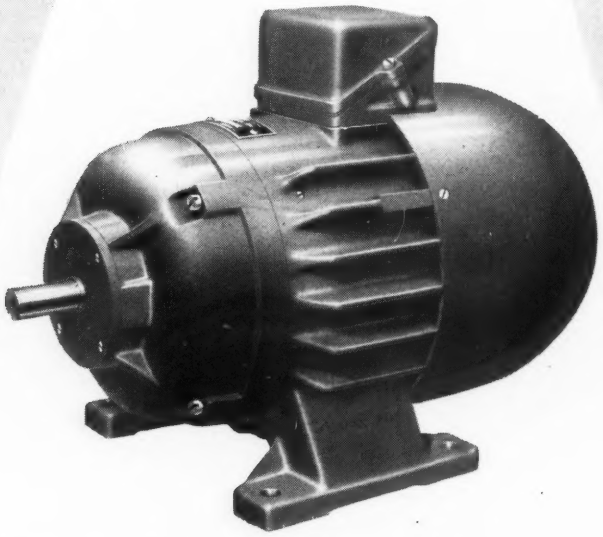
Two Speed Synchronous Hysteresis

We will be glad to furnish details on request.



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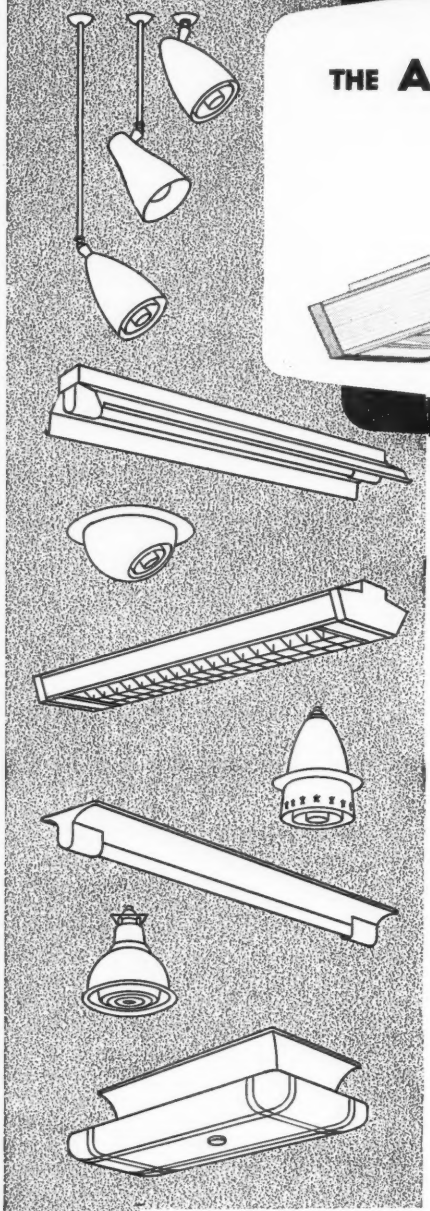
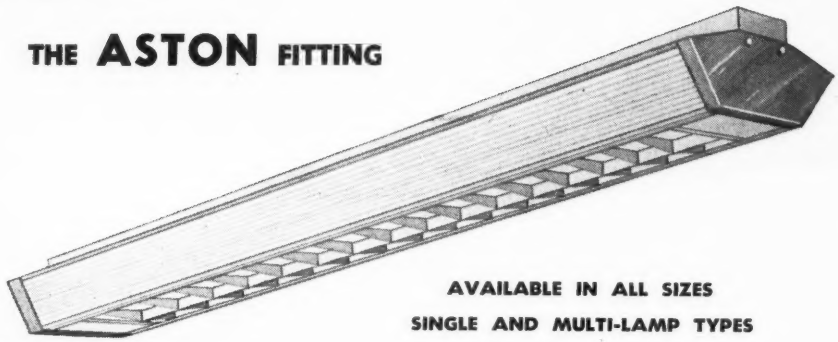


THE ASTON FITTING



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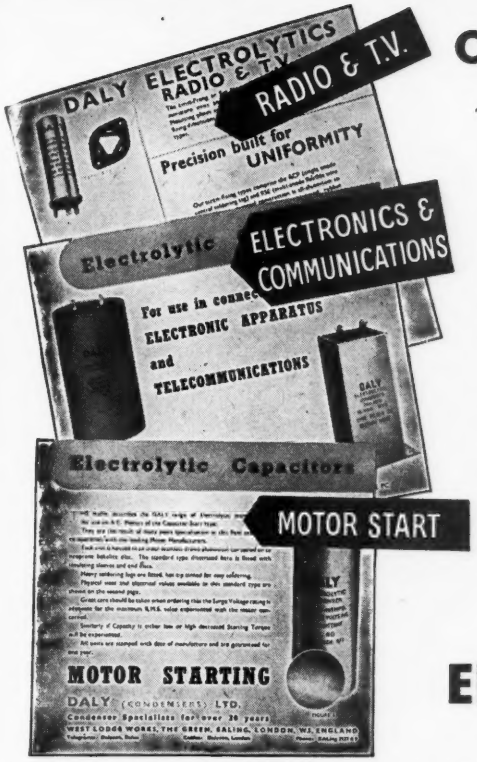


One [or more] of these leaflets is for YOU...

These three leaflets fully describe the wide range of standard DALY electrolytic capacitors. In general, the types listed will cover most requirements. Where specifications outside this range must be met, however, DALY will design and make special units to meet specific needs.

Behind DALY capacitors there lies 20 years of making only electrolytics, highly specialised experience which engineers throughout the world are finding invaluable, and which is readily available to you.

We shall be happy to send you copies of these leaflets without obligation.

DALY
ELECTROLYTIC CAPACITORS

CONDENSER SPECIALISTS FOR OVER 20 YEARS

DALY (CONDENSERS) LTD. WEST LODGE WORKS, THE GREEN, EALING, LONDON, W.5 *Phone: EALing 3127-8-9. Cables: DALYCON, LONDON*

The strange case of the varnished nylon

On reflection, I submit, not so strange as one would think. This young lady is about to leave for equatorial Africa where, as I understand, the Varnished Nylon manufactured by our good friend Symons is particularly trustworthy. Indeed, under tropical conditions anywhere it combines mechanical strength with excellent electrical properties. It has, you will observe, two very notable features. First, it is unique in that as a straight cut tape it is sufficiently extensible to replace bias cut tape in many applications. Second, it has a far higher insulation resistance under humid conditions than any other varnished fabric. A pretty case and a pretty client, if I may say so.

VARNISHED NYLON

Available in both Yellow and Black qualities. Manufactured in 4, 5 and 6 mil thicknesses, straight or bias cut, in rolls 36" wide, or as tape, any width (English or Metric measure), with straight, slit or serrated edges.

Symons
ADVISORY SERVICE

If you have an electrical insulation problem, send it to us! Our experts will be pleased to advise you.

TESTED FLEXIBLE INSULATION BY

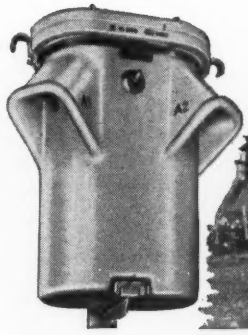
H. D. Symons & Co. Ltd.

PARK WORKS · KINGSTON HILL · SURREY
TEL KINGSTON 0091 · GRAMS INSULATION (PHONE) KINGSTON - ON - THAMES

British Power Transformers

for rural distribution

in hermetically-sealed stoneware containers



Photograph by courtesy of British Insulated Callender's Construction Co. Ltd. and the North of Scotland Hydro-Electric Board.

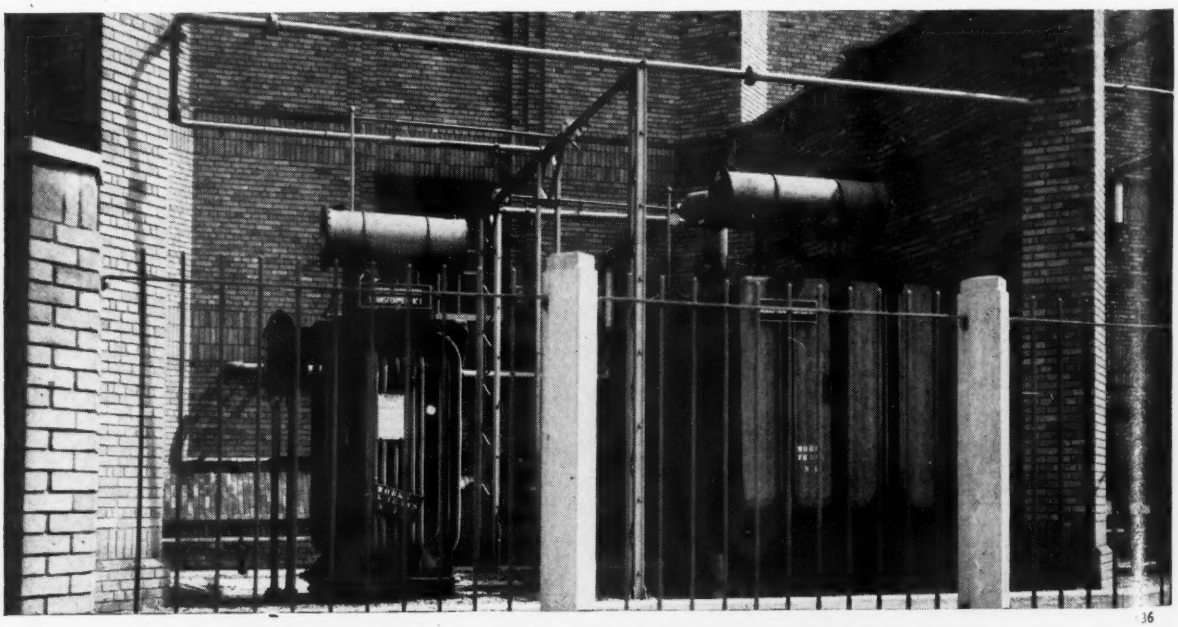
- No maintenance costs. Containers are salt and acid proof. Supporting steel work is heavily galvanised. Hermetically sealed container protects oil from acidity.
- Increased efficiency and reduced operating costs due to low losses.
- High Overload Capacity.
- Simple installation—only one or two bolts required. Other types of distribution transformers, including units to the Draft National Standard Specification T.1. in steel tanks, can also be supplied.

BRITISH POWER

BRITISH POWER TRANSFORMER CO. LTD.

Telephone: HOWard 1492 QUEENSWAY, PONDERS END, MIDDLESEX *Telegrams: Vitrohm Enfield*

BP/3112/AH



TRANSFORMER PROTECTION by Mulsifyre

Transformers at Croydon Power Station, B.E.A., protected by the 'Mulsifyre' system of extinguishing oil fires.

MATHER & PLATT LIMITED

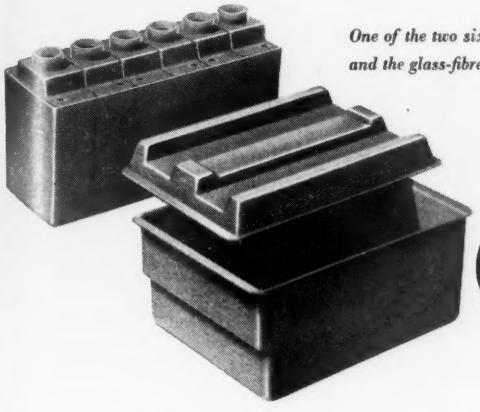
PARK WORKS · MANCHESTER 10
PARK HOUSE, 22 GREAT SMITH ST, LONDON, S.W.1.

for a revolutionary new battery Varley choose NATIONAL Plastics

Two of the newest plastics materials, shock-resisting polystyrene and glass-fibre with polyester resin, make the moulded battery housings and case for the revolutionary Varley Aircraft Battery.

The Varley method of lead acid battery construction, combined with this imaginative use of new plastics materials, results in an aircraft battery of very high performance which is small in size, light in weight and very efficient under all flying conditions. It is approved for use in jet and turbo-prop aircraft, and after extensive tests of life and performance, has been chosen by the Bristol Aircraft Company for their "Britannia" Aircraft.

All mouldings are made at our Walthamstow factory — the largest in Europe devoted to the production of plastics mouldings and extrusions. At Walthamstow, also, are the ancillary services — Tool Design and Tool Making, Product Design, Development and Laboratory services — all freely available to our customers.

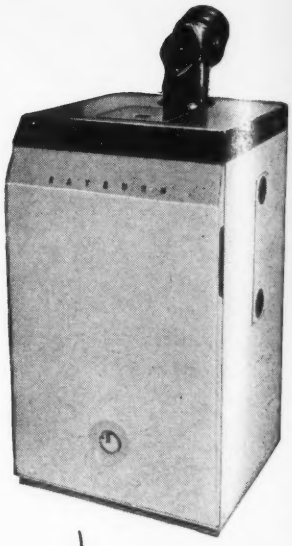


One of the two six-cell polystyrene boxes with its six lids and the glass-fibre polyester resin outer container and lid.

NATIONAL PLASTICS (SALES) LTD.

Sales organisation for British Moulded Plastics Limited

AVENUE WORKS, WALTHAMSTOW AVENUE, LONDON. E.4. . . . *LARkswood 2323*



that's fixed that!

58 Spire Speed Nuts are used to assemble the new Rayburn Domestic Boiler.

This is cheaper and quicker than the old method of using welded and riveted attachments in blind assembly locations—*a good deal* cheaper and quicker. Here's how they work on the Rayburn Boiler:—SNJ Nuts secure the door hinges, the door liner to the door and the panels to the frame.

SMV Grips fix the base pressing assembly and the name plate is neatly mounted with two small SFP Fixes. As we said before, Spire Speed Nuts are a lot cheaper and quicker than the old methods—for all kinds of fastening jobs.

Spire SPEED NUTS—FASTEST THINGS IN FASTENINGS

Enquiries to:
SIMMONDS AEROCESSORIES LTD.
Byron House, 7-8-9 St. James's Street, London, S.W.1.
Head Office and Works: Treforest, Pontypridd, Glamorgan
Also BIRMINGHAM, STOCKHOLM, COPENHAGEN, MELBOURNE, SYDNEY, JOHANNESBURG, AMSTERDAM, MILAN & NEW YORK
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CRC389

BRENTFORD REGULATORS

for Electrolytic Processing

BRENTFORD Regulators are used in many of the largest plants where stepless voltage for current control is required. Supplied for manual, remote control and automatic voltage or current control for high tension or low tension supply with secondary voltage and current to suit customers' own requirements.

Brentford Voltage Regulators installed by the Westinghouse Brake and Signal Co. Ltd. in the new Electrolytic Plant at the Glamorgan Alkali and Acid Co. Ltd., Pontypridd, S. Wales.

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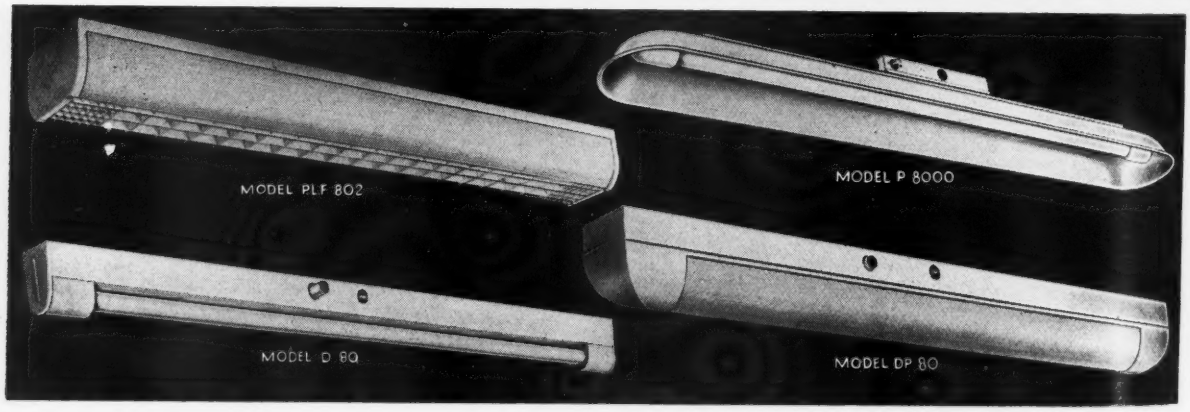
THE RELIABLE PROCESS

FOR CHROME PLATING ZINC DIECASTINGS

W. CANNING & CO. LTD. GREAT HAMPTON ST. BIRMINGHAM 18. LONDON & SHEFFIELD



UTILAIR Authentic Lighting is fluorescent lighting at its best, providing to the full the benefits of greater illumination, with considerable saving in current consumption.

Our long and successful experience in designing and manufacturing fluorescent equipment has brought us to the high standard of perfection exemplified by the models illustrated.

We shall be pleased to advise and assist with any special requirements and the services of our Technical Departments are at all times at your disposal.

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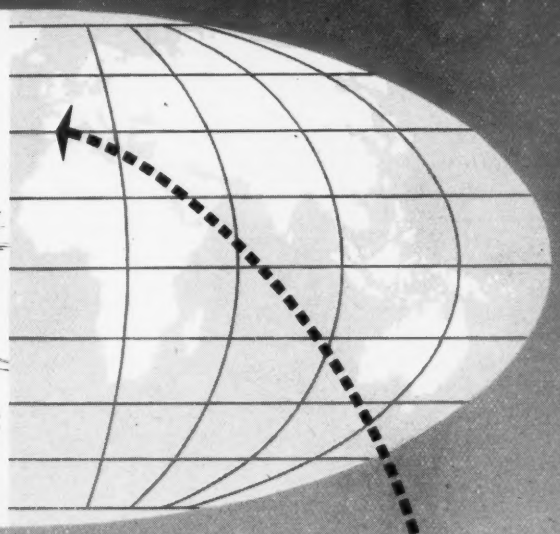

PORTUGAL

another country using . . .

Portugal is among the many overseas countries to which TELCON Paper Insulated CABLES are exported for power distribution and transmission requirements. They are available in a complete range and in all voltages up to 22 kV. Your enquiries are invited.

TELCON CABLES

PAPER INSULATED

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Works: **TELCON WORKS, GREENWICH, LONDON, S.E.10** *Telephone: GREenwich 3291*

Branch Office: **43 FOUNTAIN STREET, MANCHESTER 2** *Telephone: CENtral 0758*

TELCON

STAMFORD ALTERNATORS ARE *DESIGNEDLY* SUPERIOR

★ **ACCURATE VOLTAGE REGULATION AT ALL LOADS** ± 1½% on three phase

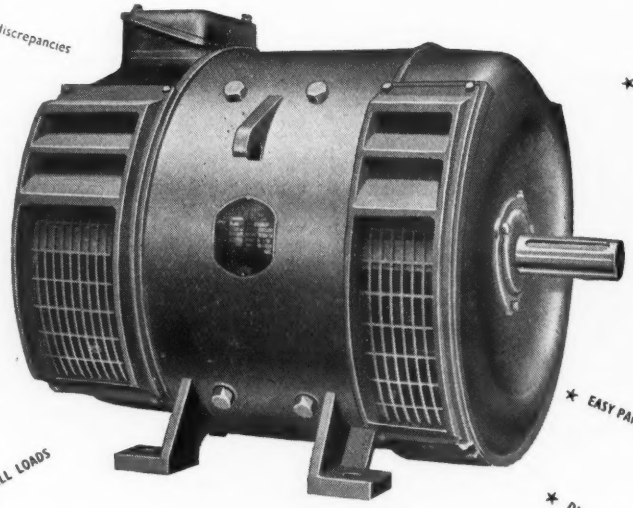
★ **REGULATION ADJUSTABLE ON SITE** to compensate for engine governing discrepancies

★ **REGULATION MAINTAINED** at low power factors right down to zero lagging

★ **IDEAL FOR ELECTRIC MOTOR LOADS** —handles heavy starting currents with ease

★ **THREE PHASE SYSTEM OF COMPENSATION** handles out-of-balance loads

★ **ACCURATE WAVE FORM AT ALL LOADS** —ideal for electronic work



★ **NO EXCITER OR COMMUTATOR** —maintenance practically negligible

★ **EXTREMELY RAPID RESPONSE** to changes in load

★ **POSITIVE SELF-EXCITATION** even after long idle periods

★ **LIGHT WEIGHT AND SMALL SIZE** enables compact sets to be designed

★ **EASY PARALLEL RUNNING** with other makes of alternator

★ **DUAL VOLTAGE AND/OR PERIODICITY** for Government Department requirements

BORN OF YEARS OF EXPERIENCE IN BUILDING ENGINE-DRIVEN SETS

STAMFORD

SELF-REGULATING ALTERNATORS

Supplied to THE AIR MINISTRY, MINISTRY OF SUPPLY, CROWN AGENTS FOR THE COLONIES, OVERSEAS GOVERNMENT DEPARTMENTS, LEADING OIL COMPANIES, and others.

Our Switchgear Division specialise in the building of Control Panels to individual requirements.

ARTHUR LYON & CO. (ENGINEERS) LTD., ELECTRIC MOTOR DIVISION, TELFORD WAY, LONDON, W.3.

A Member of the MEWASE GROUP

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PUMPS · ELECTRIC MOTORS · GENERATING SETS · ALTERNATORS · SWITCHGEAR

Have you had your copies ?

If you are concerned with the design or installation of electrical equipment you will find these publications handy sources of reference.

Copies are available on request from:—

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B.I. Callender's

CRYSELCO FLUORESCENT *Lamps*

MADE IN ENGLAND

In

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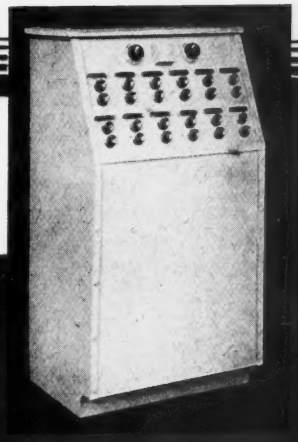
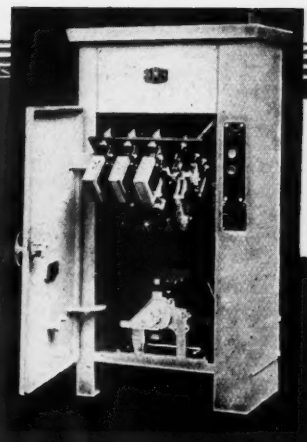
CRYSELCO LIMITED KEMPSTON WORKS BEDFORD



Remote Control Desk for group motor starting with indicator lamps.

A variety of arrangements is available to suit individual requirements.

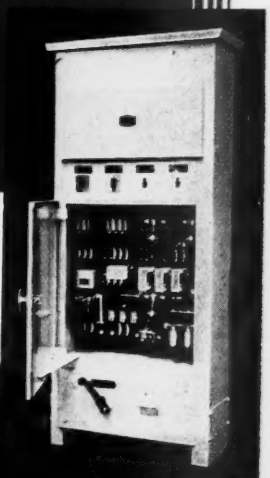


Type DO.75 Single Pillar motor starter showing accessibility of interior (isolator shield removed).

Fitted with local push-buttons and "Local Remote" rotary selector switch.

Type M. 150 Contactor Unit suitable for direct mounting on Capacitor tank for power factor correction.

Pillar-type motor starter incorporating three direct-on starters and one stator rotor starter arranged for automatic sequence control and fitted with isolating switch.



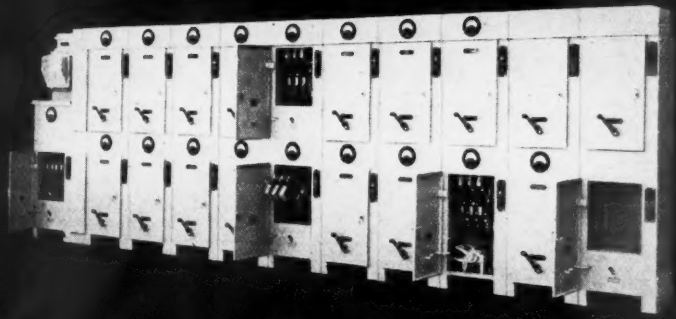
22 Unit Double Tier motor control switchboard comprising 300 amp. incoming switch and fuse unit, and contactors catering for various duties up to 100 H.P.

AIR BREAK

ELECTRIC MOTOR CONTROL GEAR

FOR INDUSTRIAL APPLICATIONS

(up to 650 volts A.C.)



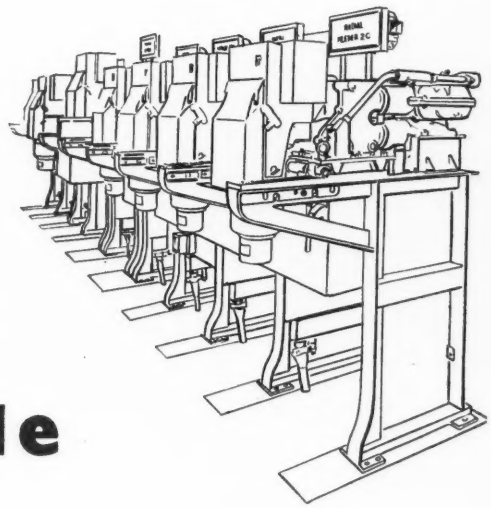
Single Tier motor control switchboard with individual isolation, ammeters and arranged for local push-button control.

the Belmos company limited

BELLSHILL LANARKSHIRE

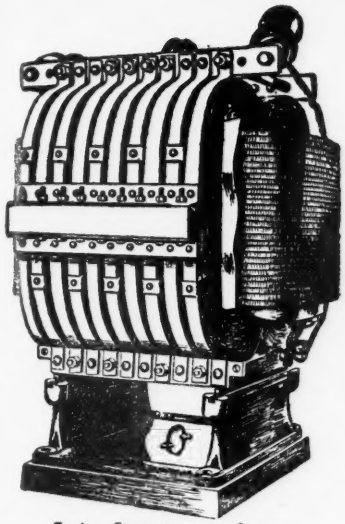
LONDON OFFICE: COLUMBIA HOUSE, ALDWYCH, W.C.2

Control-room at the
Vacuum Oil Company's
CORYTON Refinery for the
three switchboards
of 11-kV type-C7T
metalclad switchgear



Reyrolle

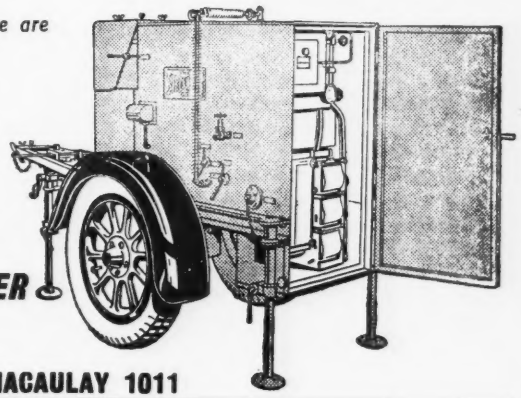
A. REYROLLE & COMPANY LIMITED · HEBBURN · CO. DURHAM



Early Ferranti transformer built in 1891 now in the Science Museum, S. Kensington

The first Transformers created a problem . . .

Oil-immersed Transformers and Switchgear were essential to the advance of electricity by permitting heavier loads to be carried by smaller conductors, but for their efficient operation the oil must be maintained at the highest standard of purity, dryness and insulating capacity. For the past 30 years Stream-line Filters have ensured the safety and efficiency of transformers and switchgear in 62 countries of the world. There are over 40,000 satisfied users.

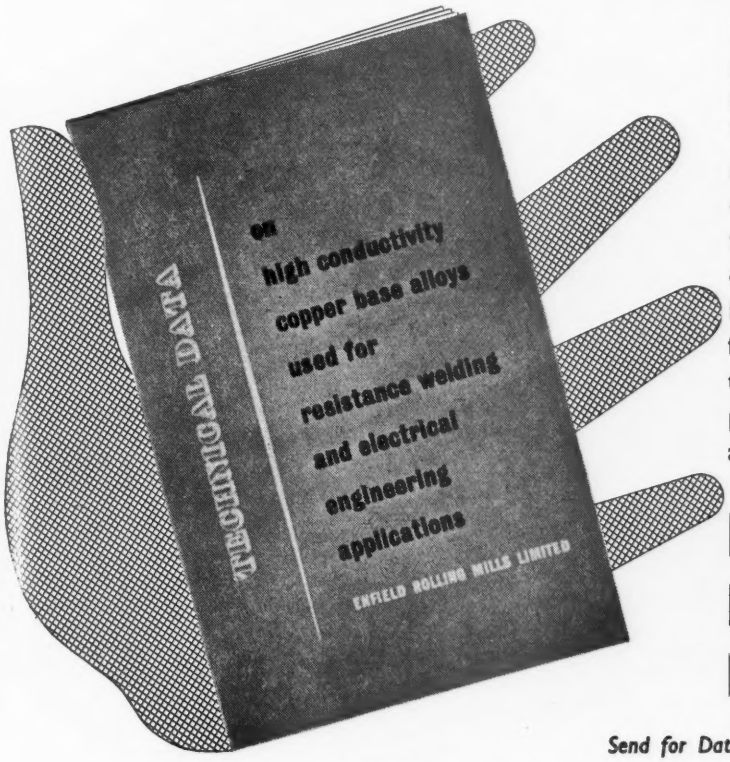


Stream-line

FILTERS PROVIDE THE ANSWER

STREAM-LINE FILTERS LTD.

INGATE PLACE, LONDON, S.W.8. TELEPHONE: MACAULAY 1011



ERM High Conductivity Copper, Base Alloys for Electrical Engineering and Resistance Welding Applications. We manufacture a wide range of alloys giving high strength with good electrical conductivity combined with resistance to softening at elevated temperatures.
ERM Alloys are available as strip, bar, forgings or castings. We specialise in the production of finished machined parts from High Conductivity Copper and any of the ERM alloys.

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Send for Data Book giving full technical details.

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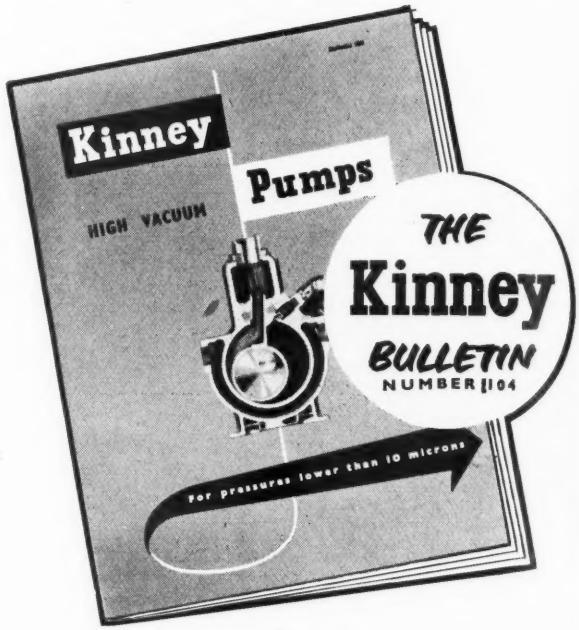


6 PAGES OF SOUND TECHNICAL ADVICE ABOUT KINNEY VACUUM PUMPS

If you manufacture products like electric lamps, coated lenses, mirrors, C.R. tubes, foodstuffs, drugs and coated foils, then Bulletin 104 has been printed for you. Here is a wealth of detail describing and illustrating Kinney High Vacuum Pumps—how they work, quoting dimensions, speeds and performance curves. Everything, in short, to demonstrate how indispensable Kinney Pumps are for up-to-date production processing. Bulletin 104 cannot fail to be of interest and (we sincerely believe!) profit. Pin this ad. to your note heading. We'll be glad to mail you by return.

GENERAL ENGINEERING CO. (RADCLIFFE) LTD.

GENERAL ENGINEERING CO. (RADCLIFFE) LTD.
Station Works, Bury Road, Radcliffe, Lancs.
Telephone: RADcliffe 2291 (3 lines) Telegrams: "General", Radcliffe
London Office: 3rd Floor, 9 Victoria Street, London, S.W.1. Telephone: Abbey 5278

260 feet a day...

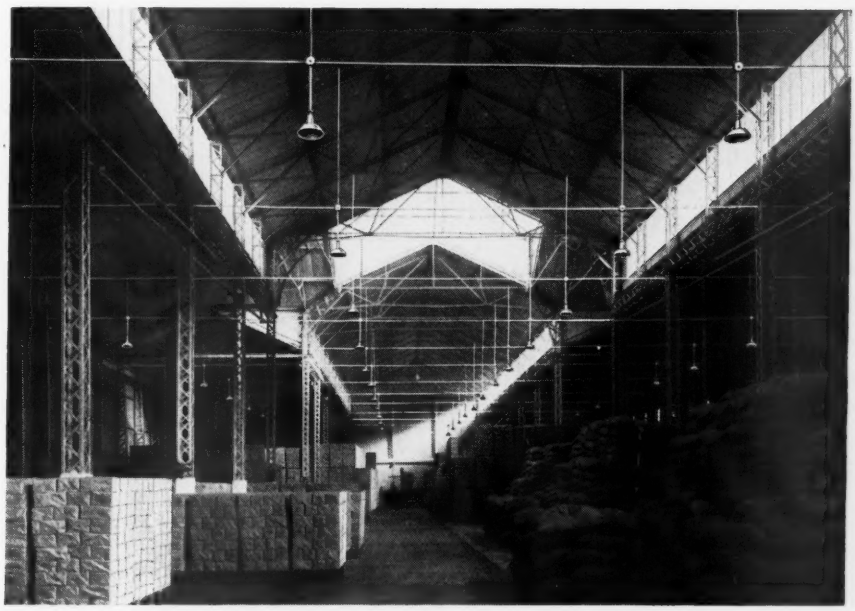
A MOST INTERESTING history is attached to this extensive new store recently erected by Tate & Lyle Limited at their Plaistow Wharf.

The original building was situated on the old White City Exhibition ground. All the steel work was dismantled, transferred to Plaistow, renovated, re-painted and re-erected, thus providing additional warehouse space in quick time and without the many problems of obtaining new materials.

Similar economies were achieved in the provision of a good all-round general illumination. From the nature of the structure it would have been a formidable and costly job to install conduit throughout the building, on account of the great height of the building and the consequent length of the droppers necessary to mount the light fittings.

By using ENFIELD GRID SUSPENSION SYSTEM the electrician concerned erected 260 feet a day, including 8 light fittings and 2 feed points. This was twice as fast as any type of conduit installation and represented a great economy in time and materials.

Moreover, the electrician and his mate had never before used Grid Suspension, but after their first experience they had no difficulty in installing more than 260 feet a day when they started on a second warehouse nearby.



Another triumph for Mr. Cube and an Enfield product

ENFIELD CABLES LIMITED, VICTORIA HOUSE, SOUTHAMPTON ROW, LONDON, W.C.1

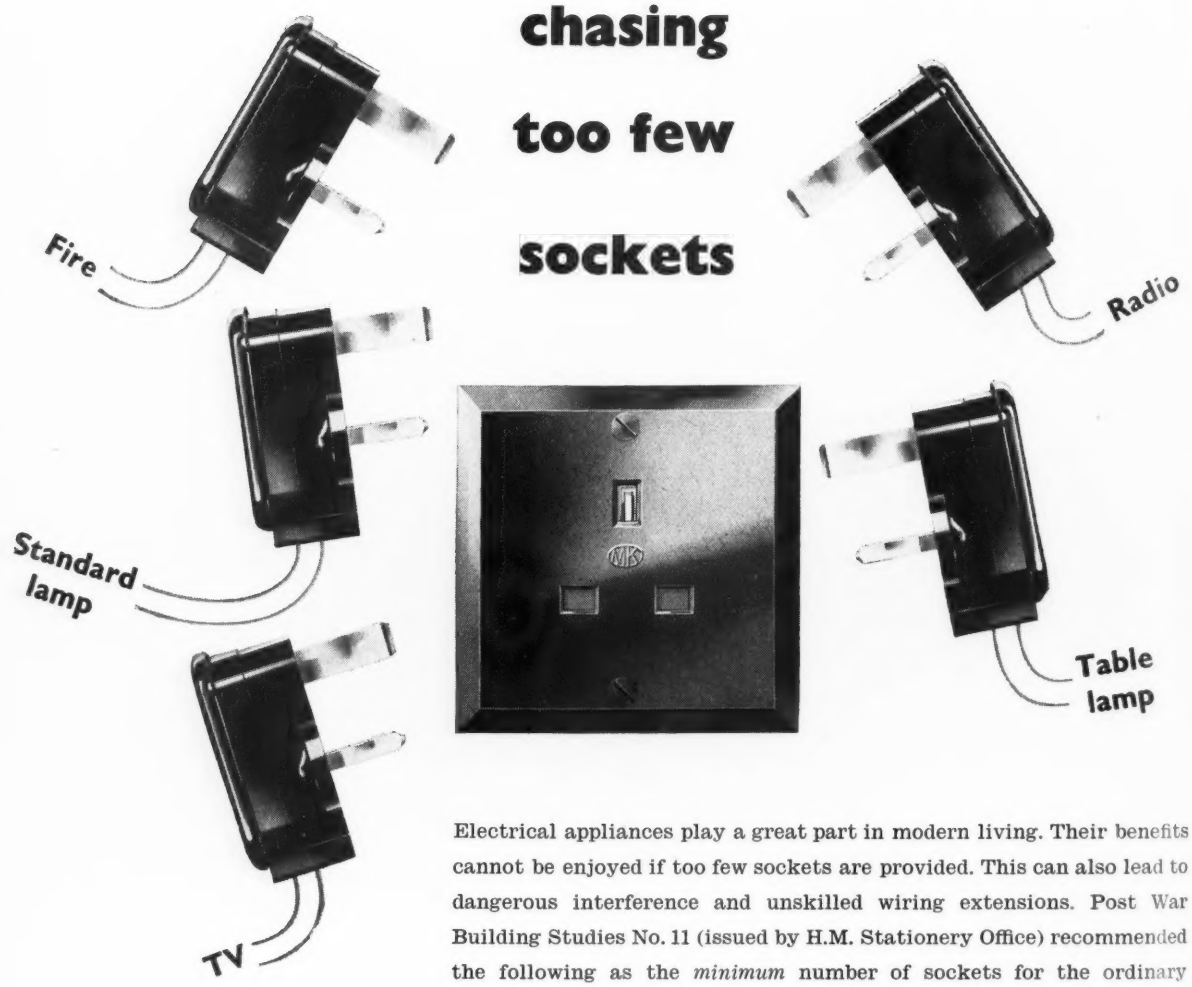
Telephone: HOLborn 9292 (London Office) · Telegrams: CABLES, ENFIELD · Telephone: HOWARD 2661 (Works)

E 32

Enfield

MK/DHB

Too many plugs chasing too few sockets



Electrical appliances play a great part in modern living. Their benefits cannot be enjoyed if too few sockets are provided. This can also lead to dangerous interference and unskilled wiring extensions. Post War Building Studies No. 11 (issued by H.M. Stationery Office) recommended the following as the *minimum* number of sockets for the ordinary small dwelling.

LIVING ROOMS	3	
DOUBLE BEDROOMS	3	
SINGLE BEDROOMS	2	
KITCHENS	3	(2 *if not intended for use as a living room*)

Our advice on accessories for ring-circuit wiring is freely available

MK ... the mark of safety

M. K. Electric Limited, Wakefield Street, London, N.18. Edmonton 5151

INTERESTED IN EMERGENCY LIGHTING?

Send for these informative booklets

Nife - Neverfayle emergency lighting has several important advantages — advantages you should know about before installing an emergency system. Nife - Neverfayle emergency lighting units are:

DEPENDABLE:
Power is instantly available because Nife Steel-Alkaline Batteries do not deteriorate even during long periods of inactivity.

CONVENIENT:
Nife equipment is exceptionally compact and there is no need for a separate battery room.

ECONOMICAL:
Since the electrolyte and active materials in the batteries are of great stability, maintenance costs next to nothing.

NIFE-
NEVERFAYLE

the emergency equipment with the steel-alkaline battery

N66B

A

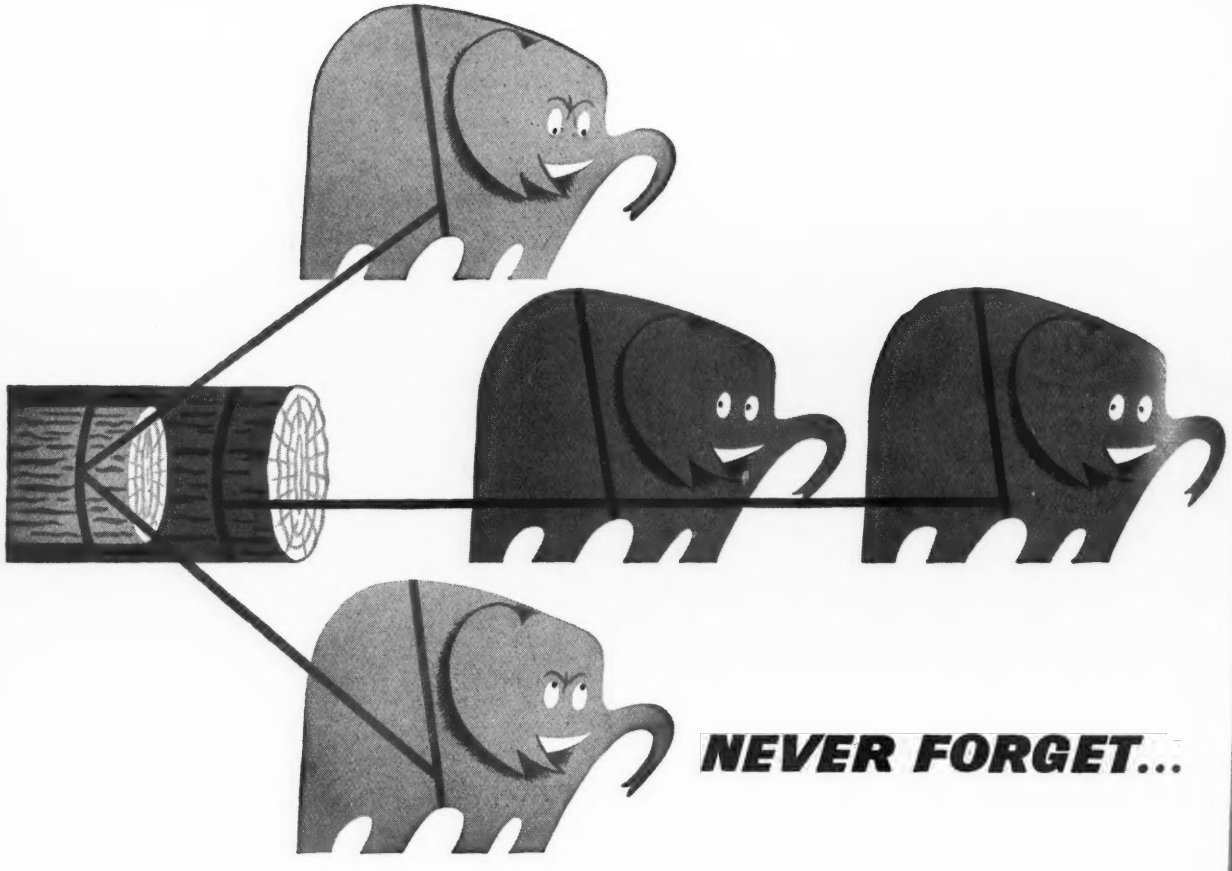
NIFE BATTERIES, REDDITCH, WORCESTERSHIRE

Please send me booklets giving detailed information of NIFE-NEVERFAYLE units for

.....(CINEMA, HOSPITAL, PUBLIC BLDG, ETC.)

NAME .....

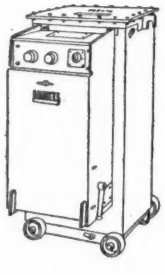
ADDRESS .....



NEVER FORGET...

AS WITH ANY OTHER labour force, if you use electrical current efficiently it will do more useful work. Current can consist of two components, one doing useful work, the other not—*you may be paying for both.*

By installing Hunts Power Factor Improvement capacitors these elements are made to pull together so that although the same work is done, the bill for the electricity you consume is reduced. Our technical staff will be pleased to advise of the saving to be made in your plant.



If you are paying a kVA maximum demand charge, or if there is a penalty clause for low Power Factor in your company's electricity agreement, Hunts P.F.I. capacitors can probably reduce your electricity bill by a considerable amount annually.

REGISTERED TRADE MARK
HUNTS
CAPACITORS
THE TRADE MARK OF RELIABILITY
Established 1901

designed to save money

A. H. HUNT (Capacitors) LTD., WANDSWORTH, LONDON, S.W.18. · **Telephone: BATtersea 1083/7.**
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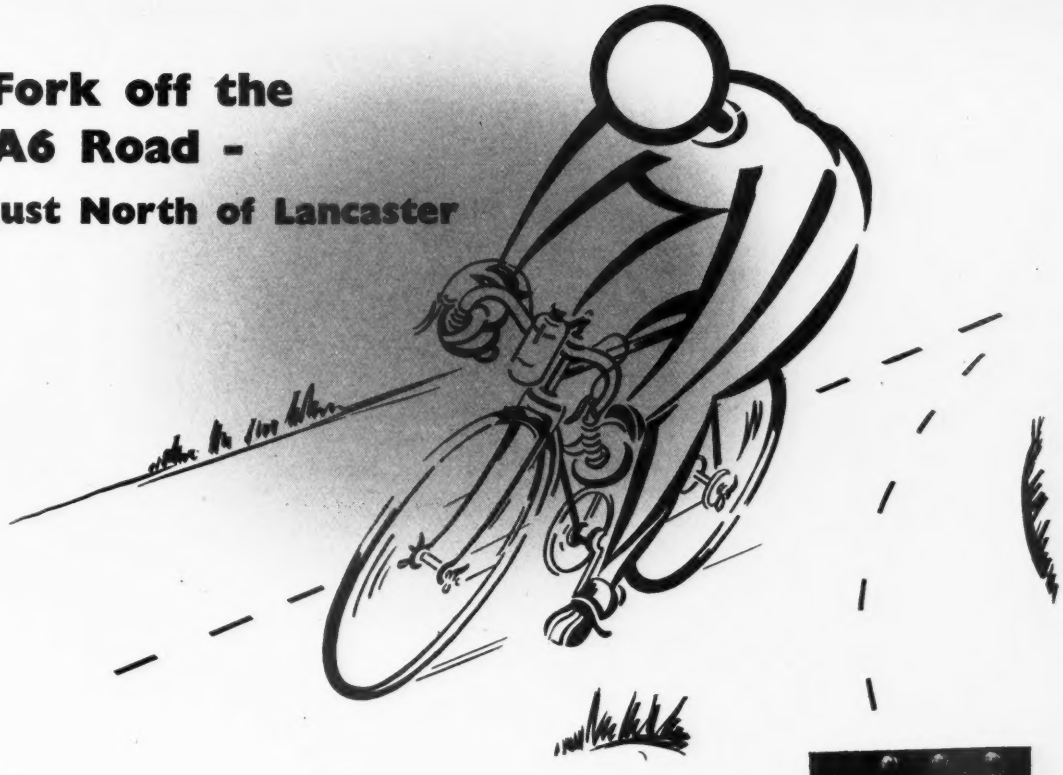
Fork off the A6 Road - just North of Lancaster



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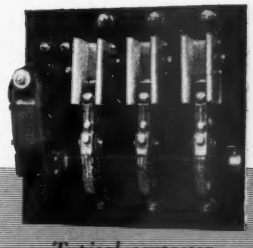

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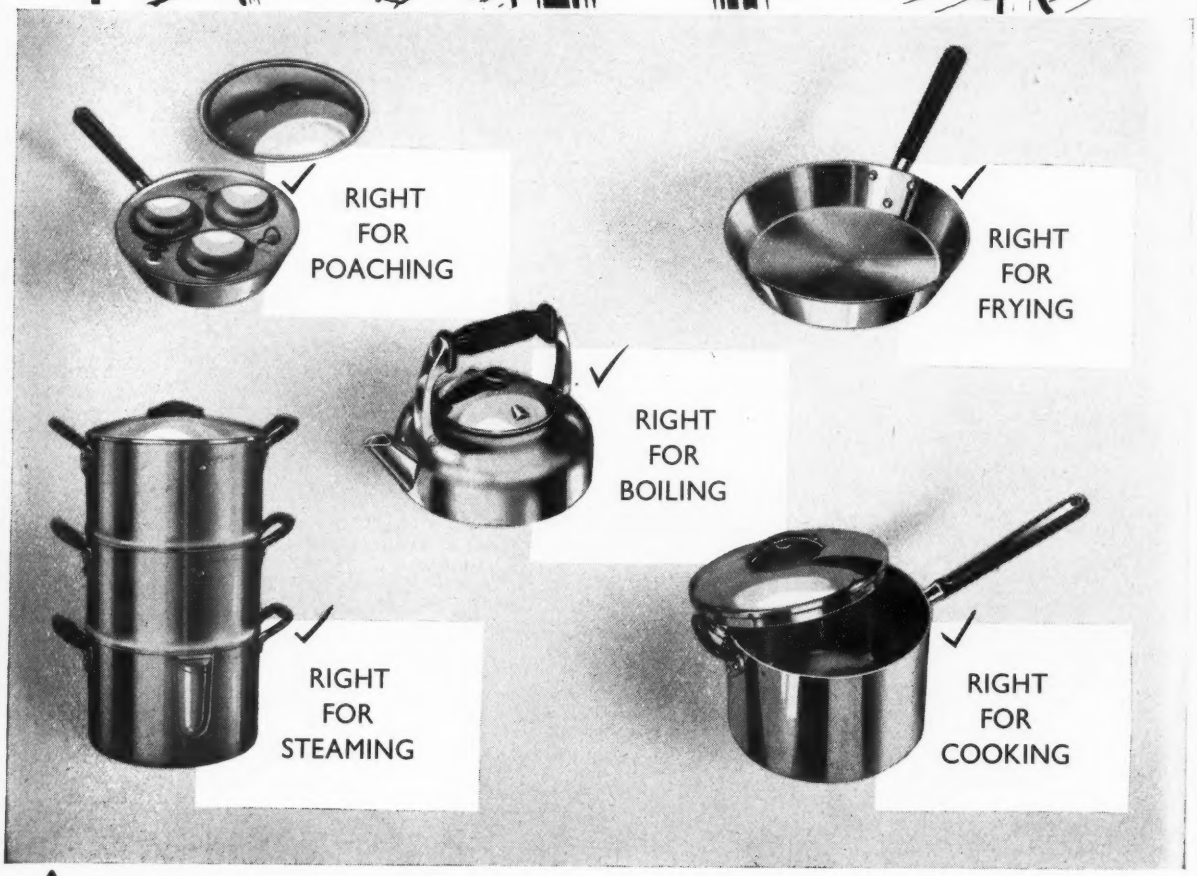

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300	B.T.H.	1120/300	Commutator
290	Verity	750	Slipring
260	Mather & Platt	587	Slipring
200	Harding & Churton	735	Slipring
175	B.T.H.	480	Slipring
120	Met. Vickers	720	Slipring
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150 h.p., 525 volts D.C. motor by L.S.E., screen protected, with pedestal B/R bearings, variable speed 700/1,500 r.p.m., with control gear.

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5	Brook	2,850	S. Prot.
5	Bull	1,450	Tot. Enc.
5	Brook	1,450	Tot. Enc.
4	Brook	2,910	S. Prot.: ½ hr. rated
4	Bull	960	Tot. Enc.
4	Brook	750	S. Prot.
3	Brook	2,880	S. Prot.: ½ hr. rated
2	Brook	2,860	S. Prot.: ½ hr. rated
2	Brook	1,420	Tot. Enc.: ½ hr. rated
2	Brook	930	Tot. Enc.: ½ hr. rated
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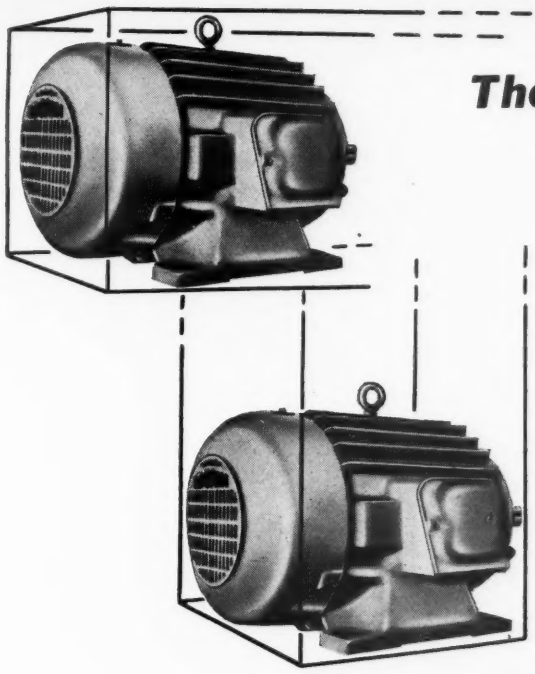

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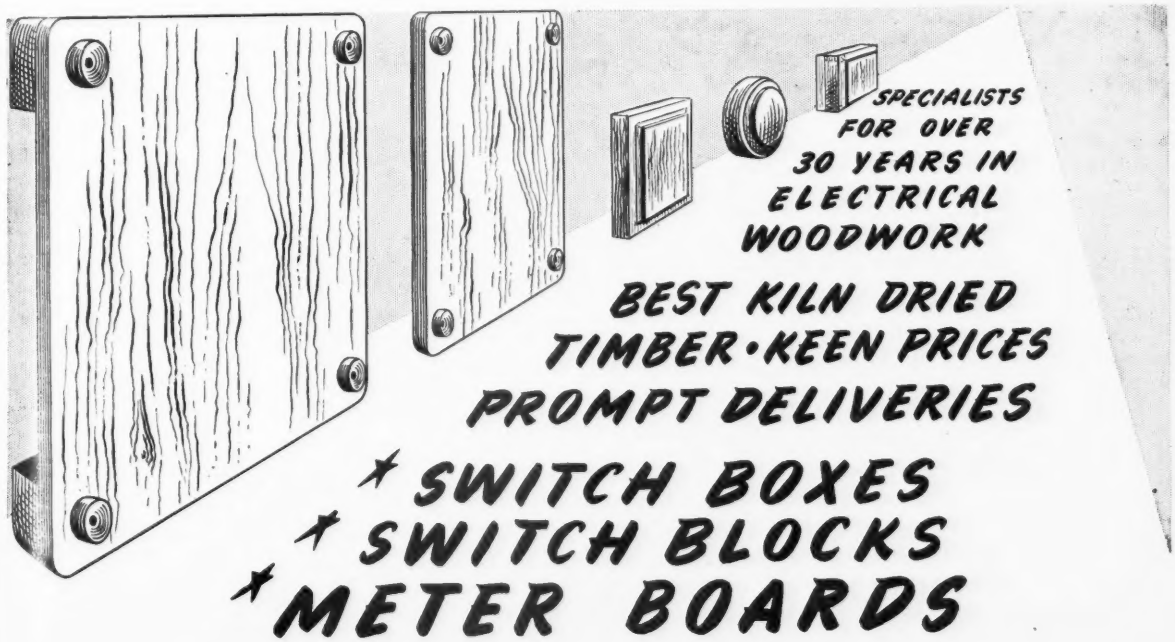

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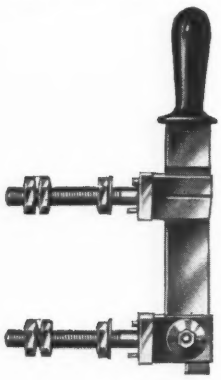

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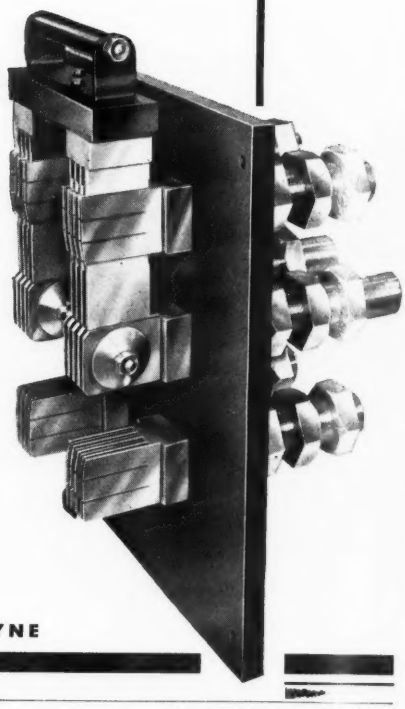

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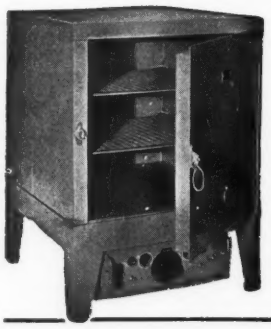

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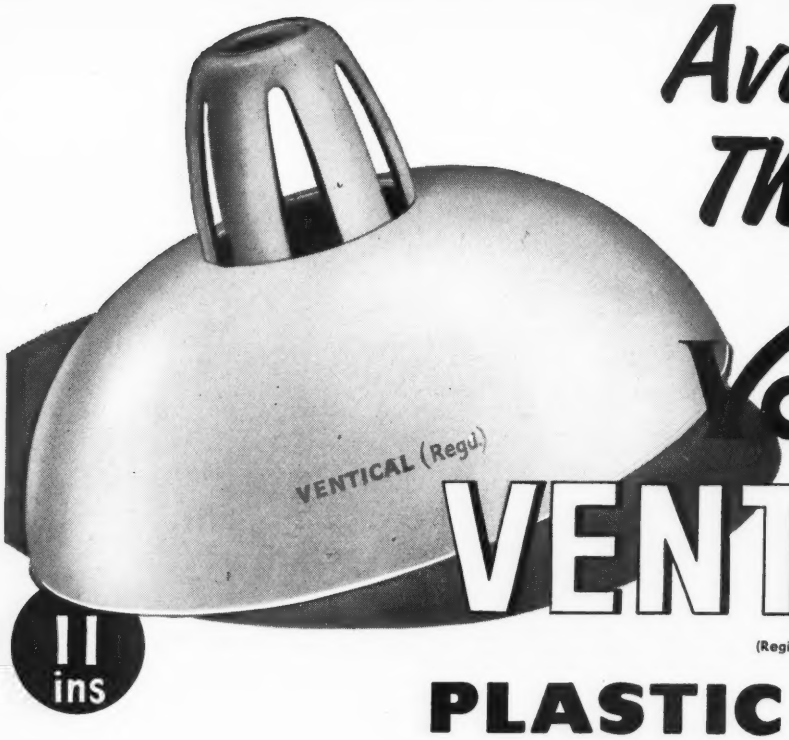

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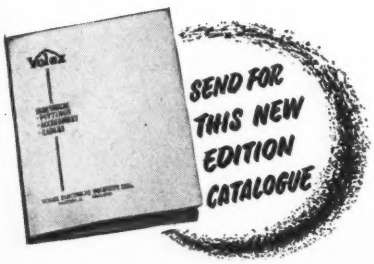

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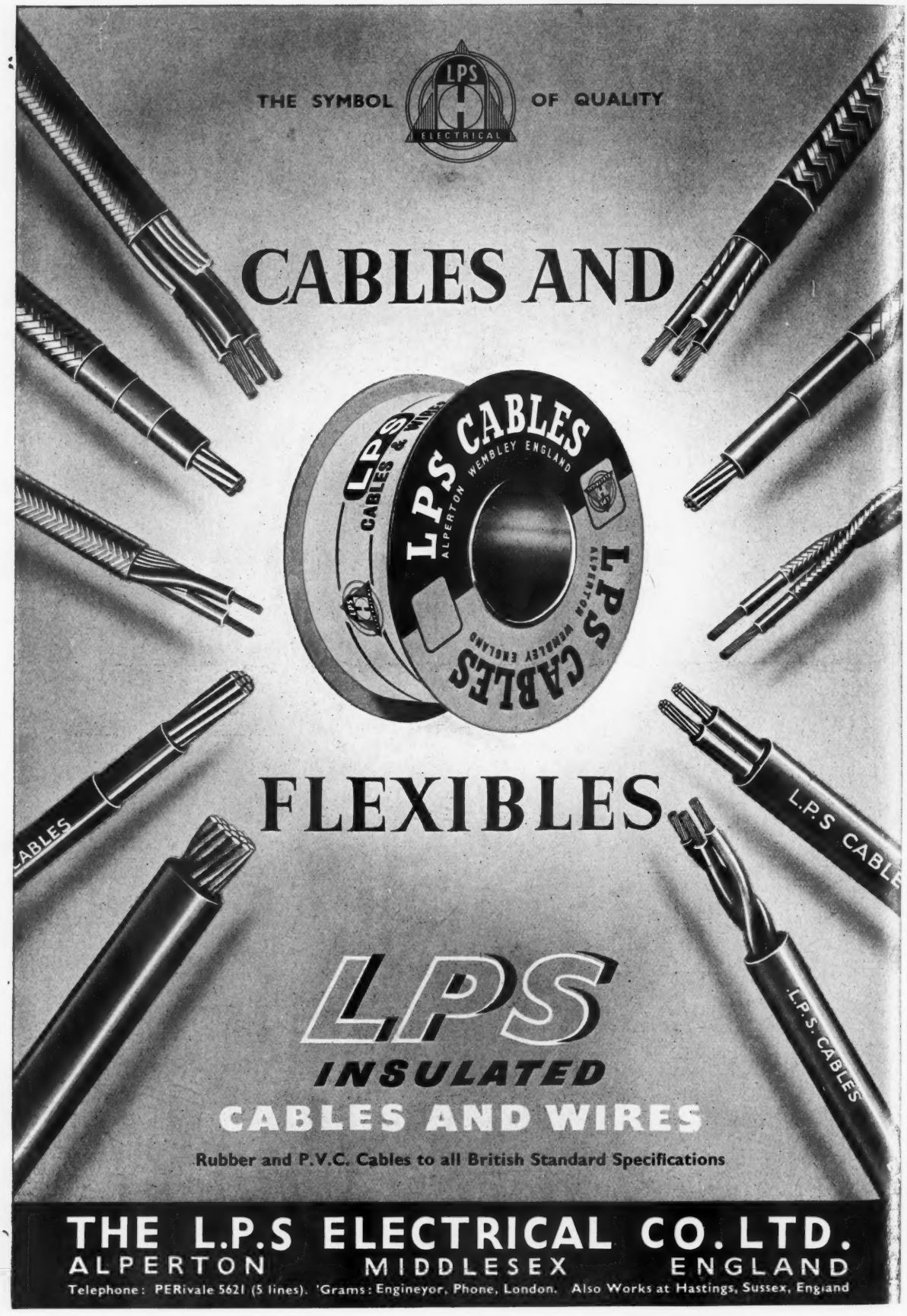
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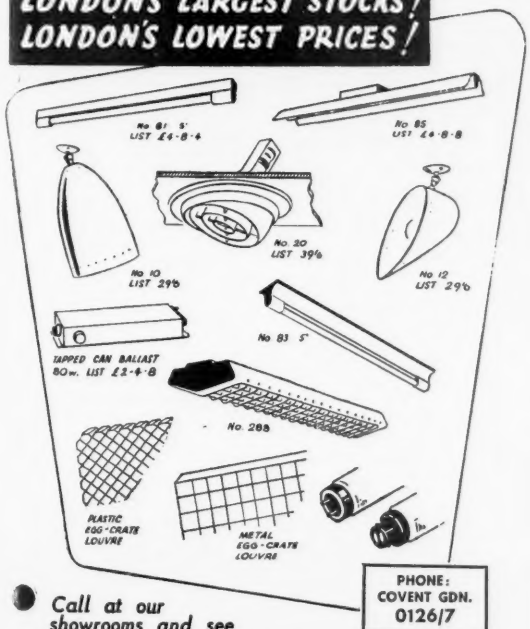

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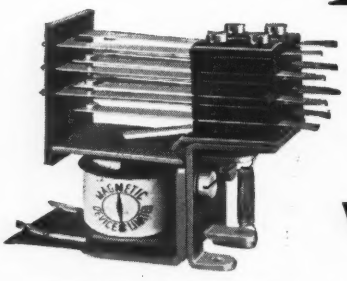

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An extremely sturdy general purpose relay, which is available in a range of contact combinations from 1 pole normally open to 4 pole changeover, and 6 pole normally open, with a maximum contact rating of 10 amps 250v A.C. Normal power consumption is 3 watts, which can be reduced for the smaller contact assemblies if required. Vacuum impregnated coils can be supplied for tropical or humid conditions.

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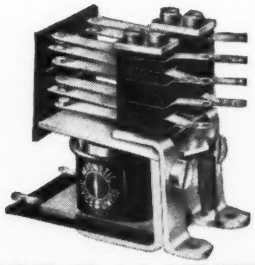

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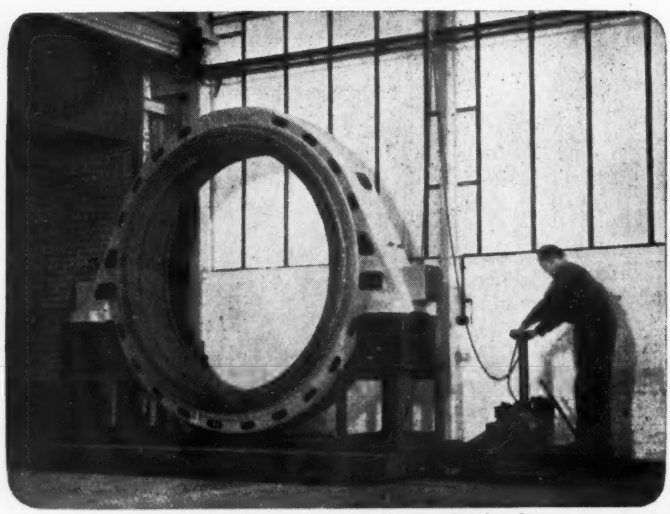

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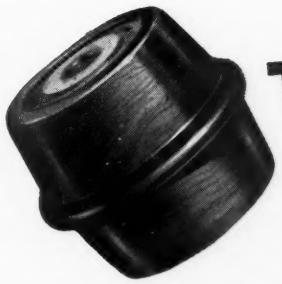

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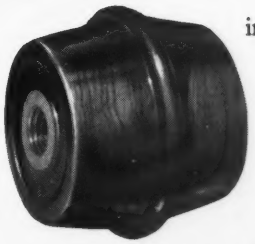

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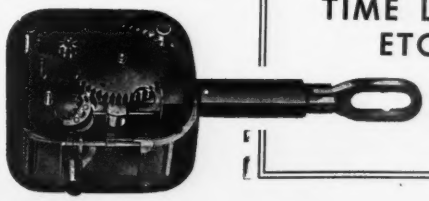

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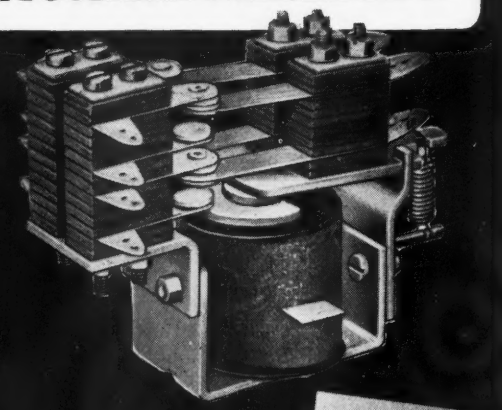

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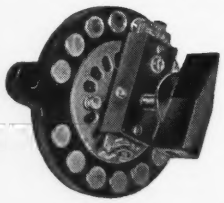

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15 amp. – 30 amp.
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SWITCHGEAR

11 kV 150 MVA

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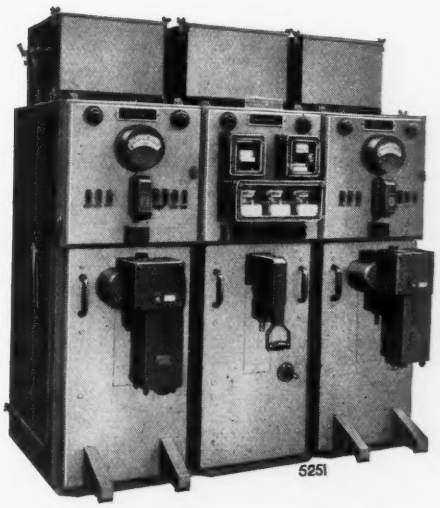

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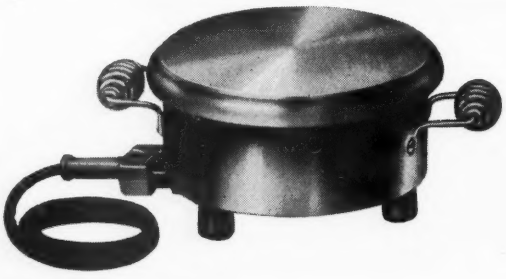

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Elements can be withdrawn without emptying down. No external tube required for circulation. All joints silver soldered. Made in lengths from 22 in. upwards. Heads $2\frac{1}{4}$ in. B.S.P.

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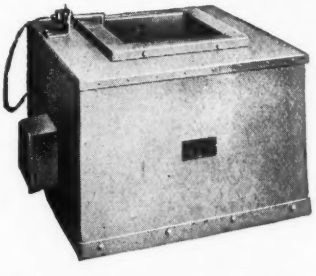
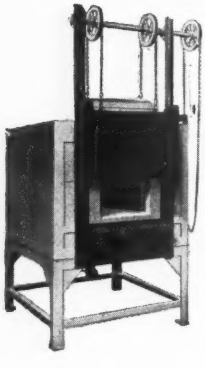
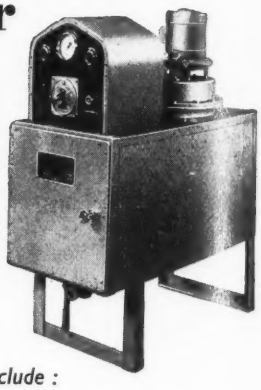


a **Special Furnace...**



***...or a* Hot Oil Circulator**

'B-W' can supply it!



INDUSTRY NEEDS HEAT

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THE industrial heating needs of modern manufacturing processes are fully met by the wide range of 'B-W' equipment. Three examples from this range are shown here. Among the standard products are small devices for better and more consistent production, and a variety of ovens and furnaces, large and small. Let us solve your heating problem—'B-W' technical "know-how" and long experience of process problems are at your disposal. Write for literature to-day.

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'B-W' Standard Products include :

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**'Pren' cables incorporate one or more layers of braided glass fibre and are finished with a fire-retarding lacquer.*

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"JIFF-V"

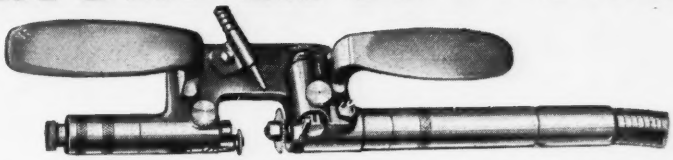
Mica Undercutting by the use of files (and "sweat") has always been regarded as a method productive of satisfactory results.

The Universal Motor driven JIFF-V Undercutter gives a similar clean "V" or "U" slot in a "Jiffy," and eliminates the hard and tedious work.

The high-speed file is easy to guide, and permits cutting clear up to the commutator risers.

Can be used on commutators of all sizes above 4" diameter, without removing the Brush Arms.

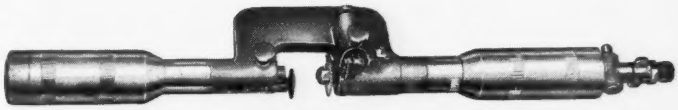
Also available with "U" cutters.



IMPERIAL Electric UNDERCUTTER

is for fast efficient "V" or "U" slotting and alternative heads and handpieces can be used for driving rotary burrs, files, mounted grinding points, polishing mops, wire brushes, sanding discs, etc.

A most efficient electric machine for both portable and shop use for commutators 6" diameter and upwards.



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is basically the same construction as the Imperial but is driven by a sturdy high-speed air motor operating at about 100 lbs. per sq. inch.

Whatever your requirements there is a suitable Martindale Undercutter to give satisfactory results

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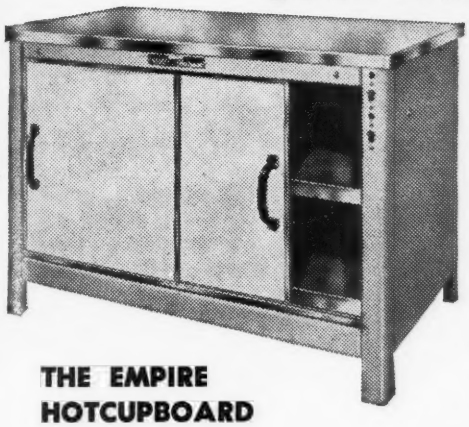

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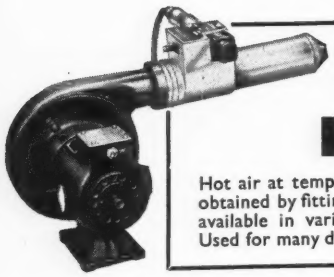

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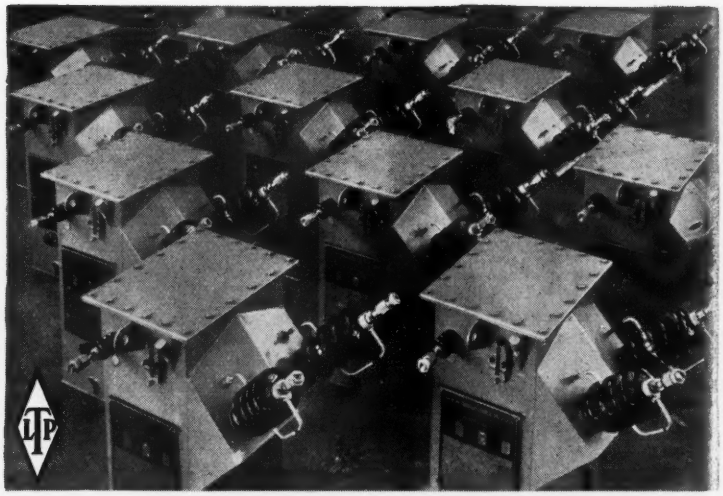

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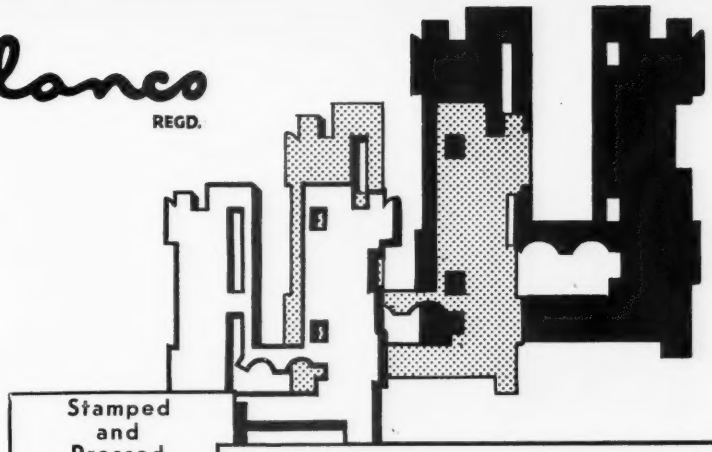

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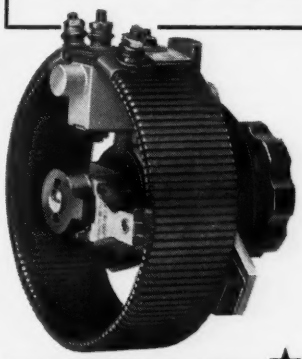

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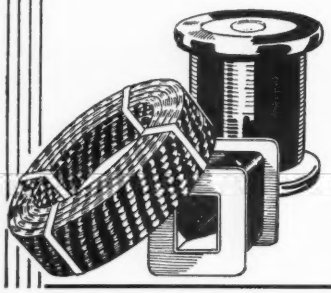

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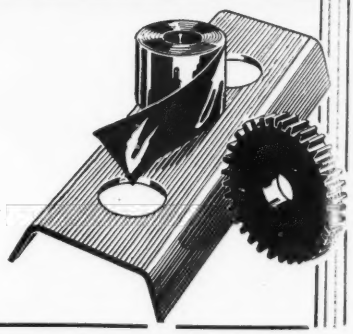

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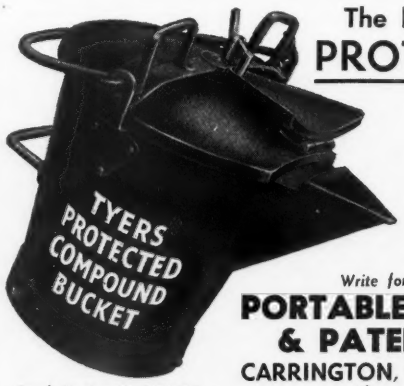

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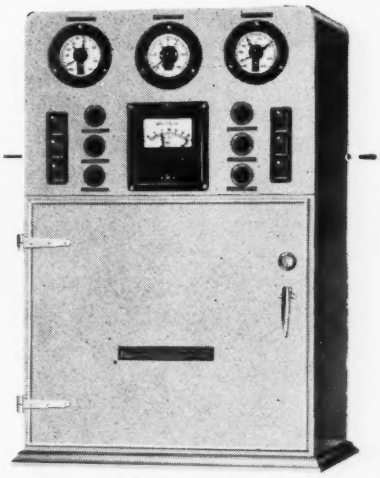
COMPLETE AUTOMATIC PROTECTION

of engine



Teddington automatic control equipment will increase enormously the usefulness and reliability of all sizes of standby installations, as not only do they automatically transfer the load to the auxiliary set in the event of mains failure, but also provide complete protection against high oil or water temperature, low oil pressure and over or under speed. It may not always be necessary to provide protection against all the hazards, so small units giving limited protection—against low oil pressure for example—can be provided at a very low cost. On important installations, it may be advisable to incorporate a system of pre-warning so that, where possible, the dangerous conditions may be corrected, so avoiding a shutdown.

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On Failure of Mains

Load is isolated from mains. Alternator diesel starts up after 10 secs. delay to allow for short period mains failure. After a further 25 secs. delay to enable the engine to attain the necessary speed, the load is connected across the alternator.

On Restoration of Mains Supply

Load is isolated from alternator and connected across the mains. Alternator diesel automatically shuts down.

Engine Warning and Protection

Should a high oil temperature, high water temperature, low oil pressure, high speed or low speed fault occur, audible or visual pre-warning can be given, followed by operation of fault indicator and engine shutdown if the dangerous conditions still persist.

* *Engine driven generators must have* *Teddington* *automatic protection*

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A very sensitive lever-actuated switch requiring ¼ — 1 oz. force to operate.

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They also make Micro-Switches for almost every other purpose.

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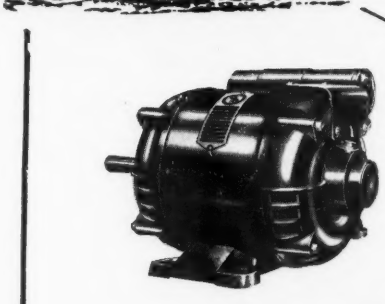

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Fractional H.P. D.C. motors.

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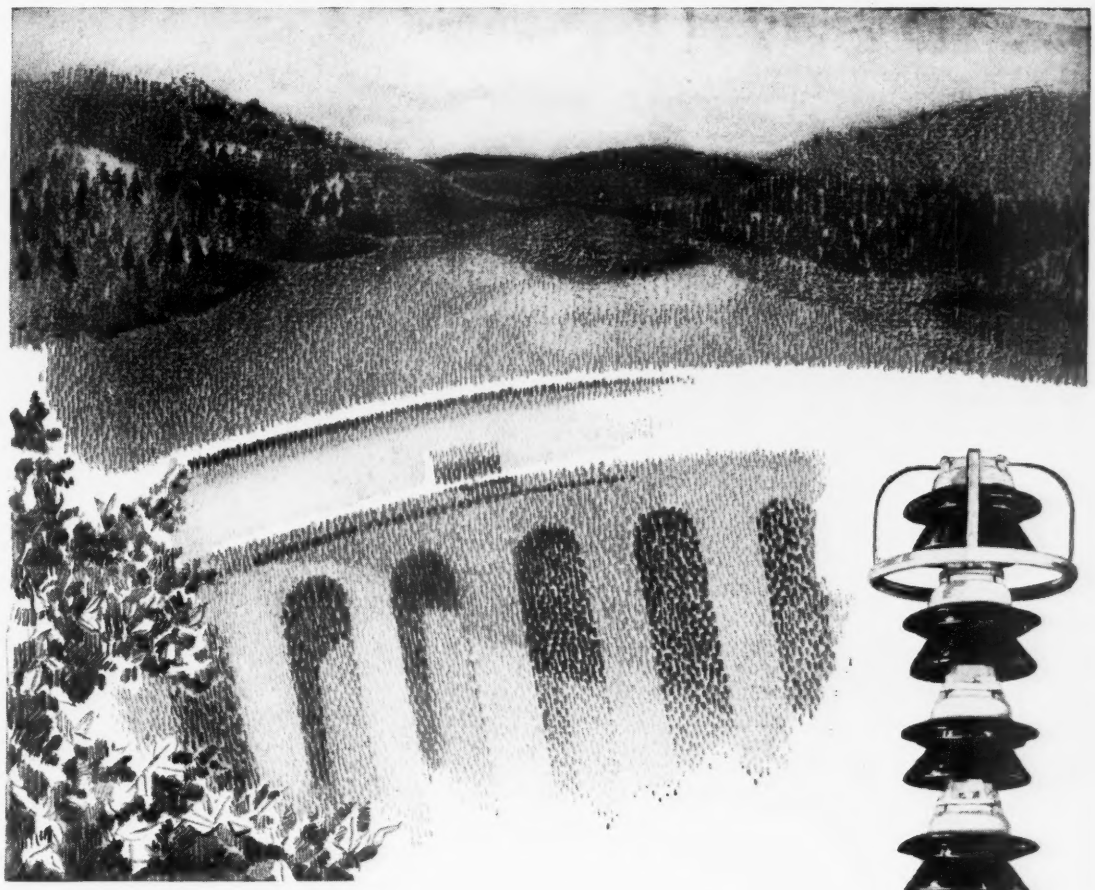

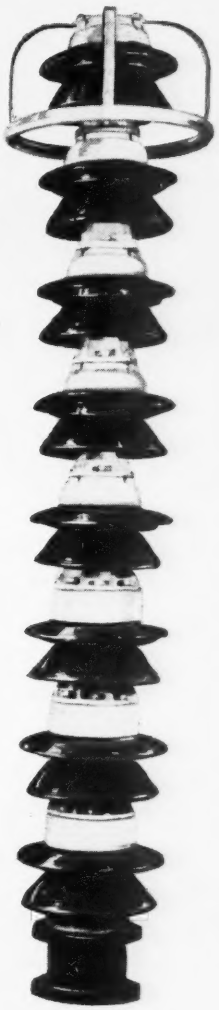

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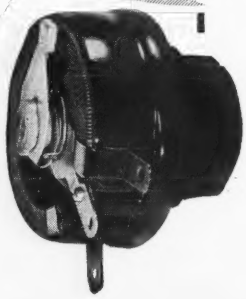

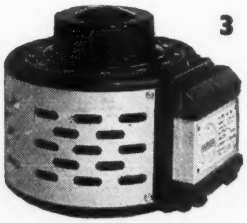

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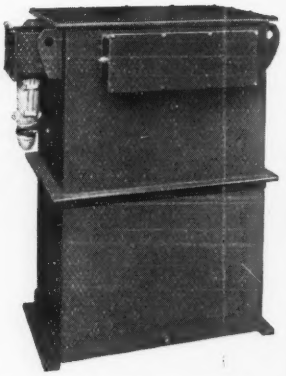

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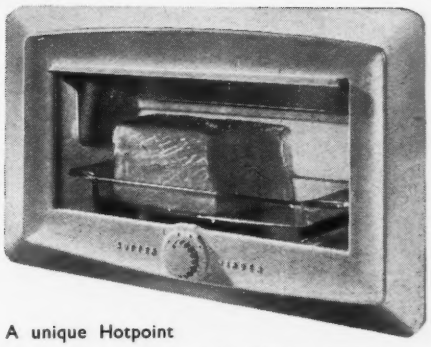

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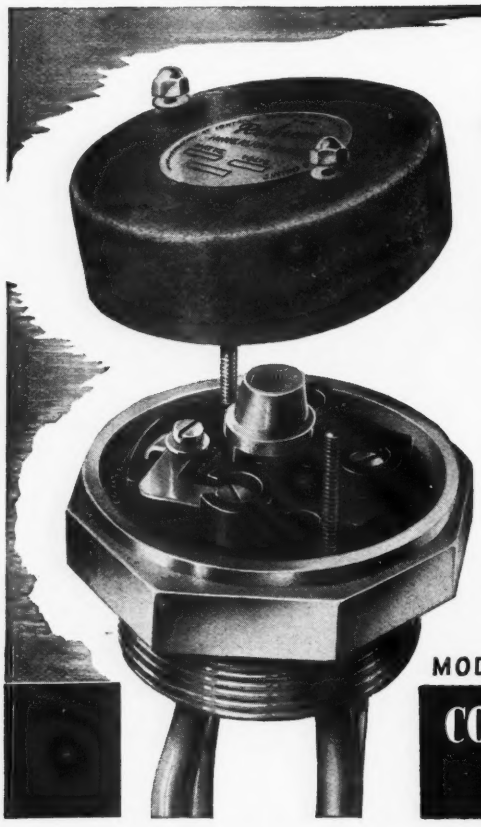

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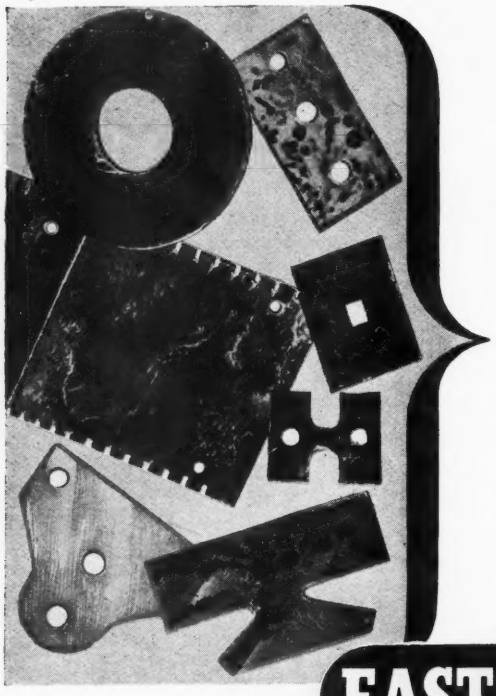

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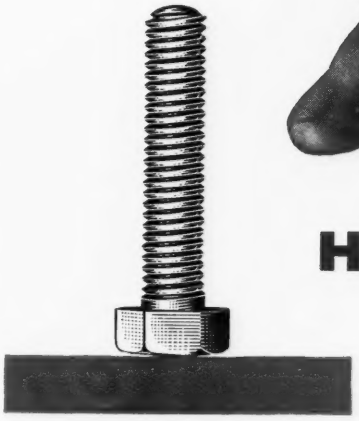

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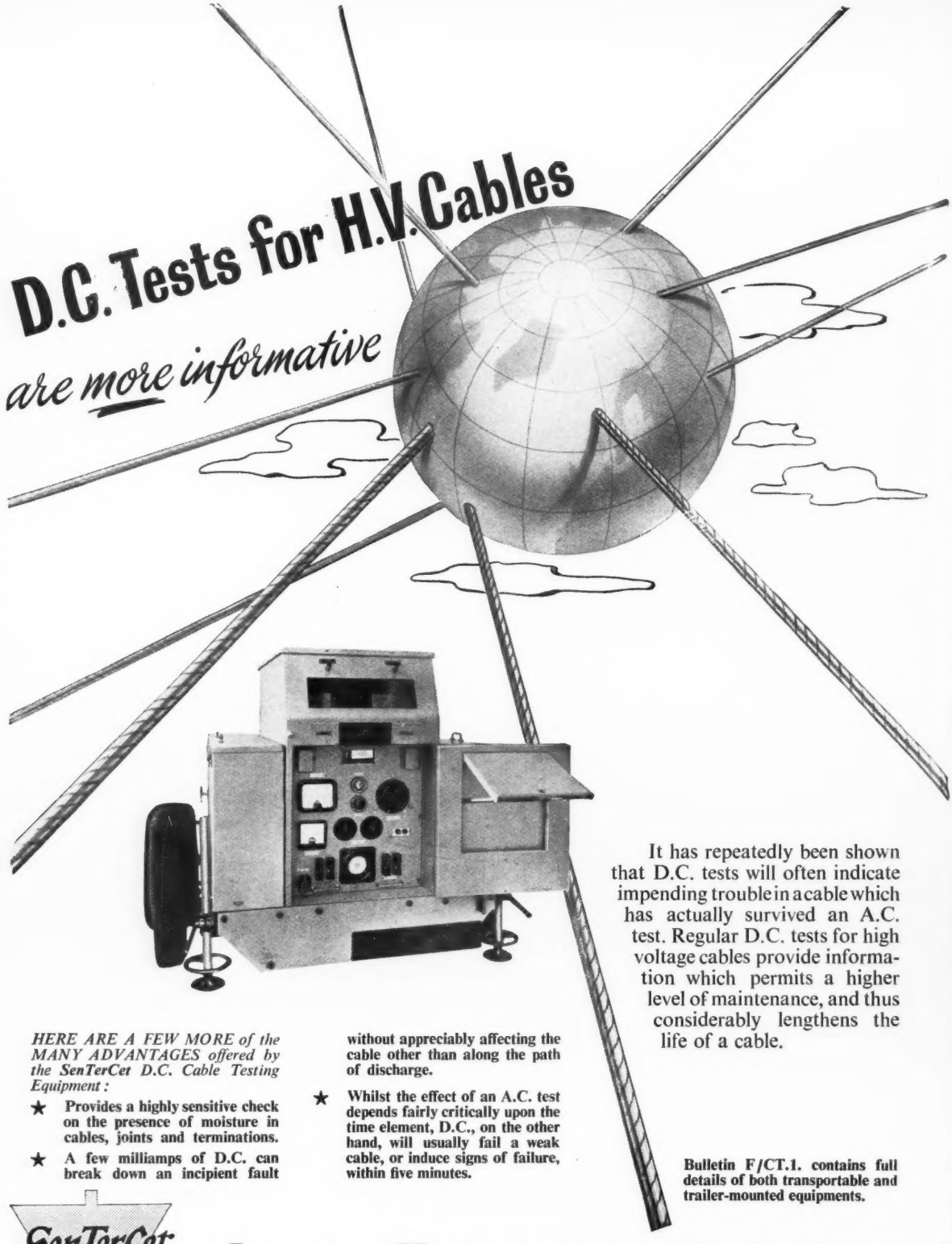

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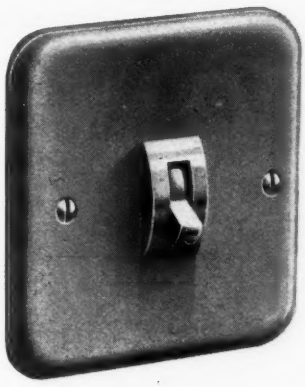

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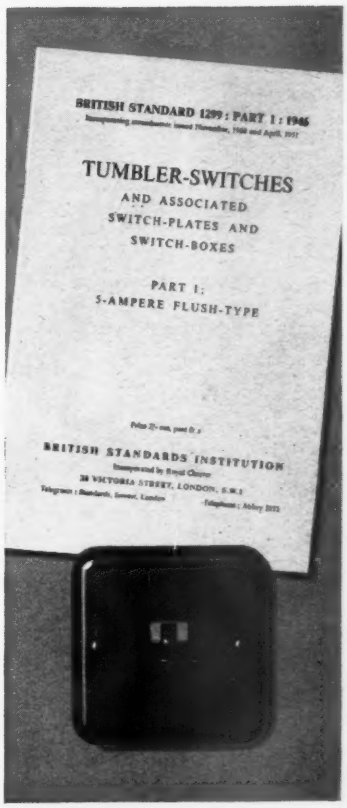

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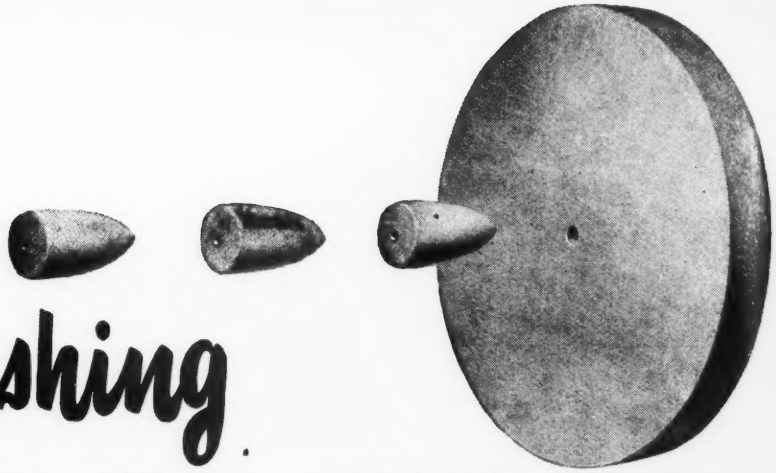

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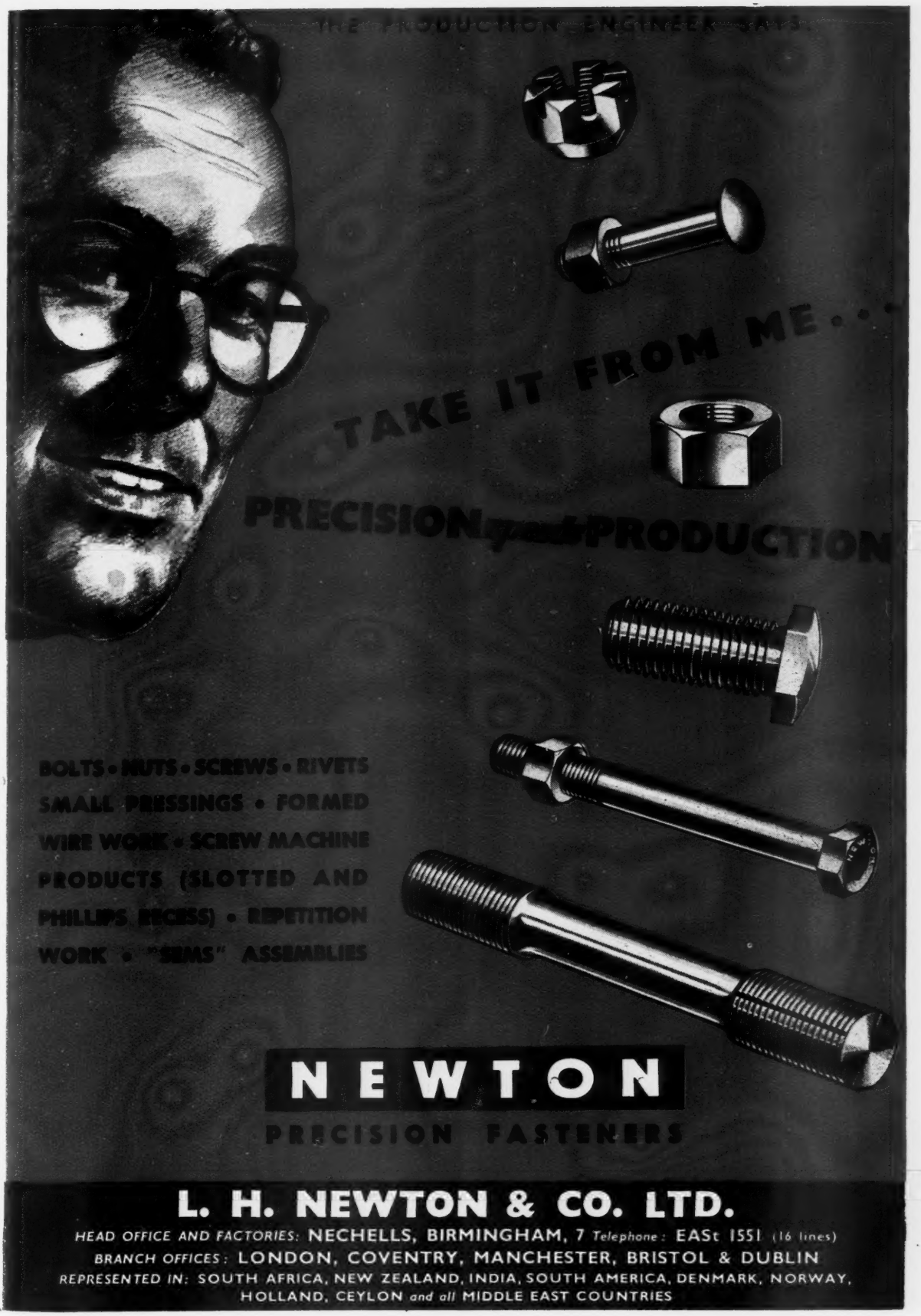
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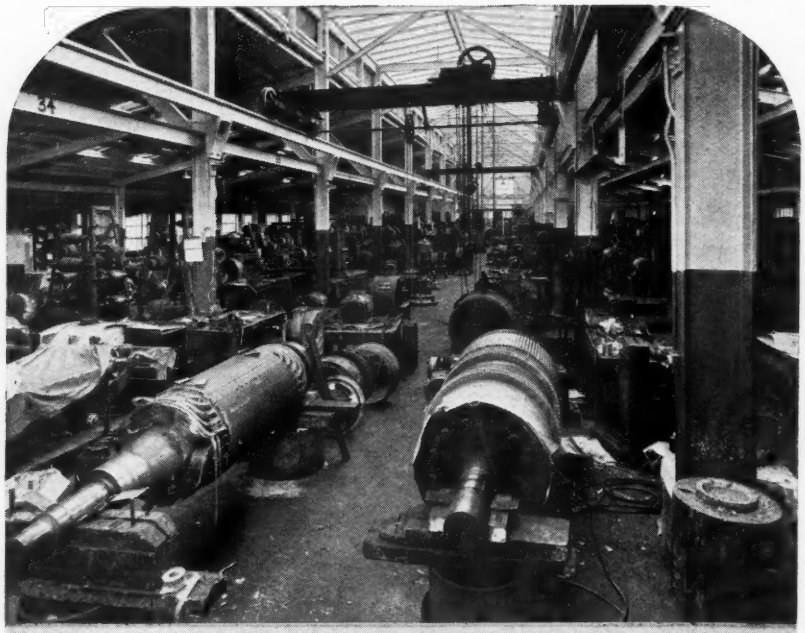

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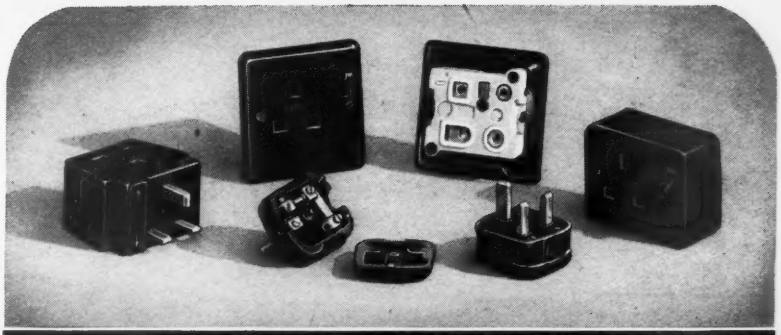

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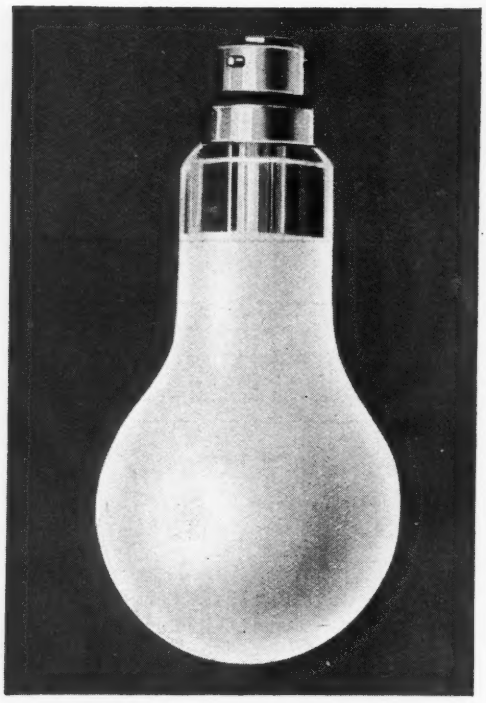

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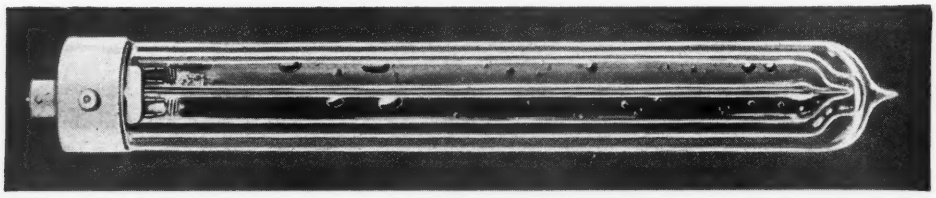

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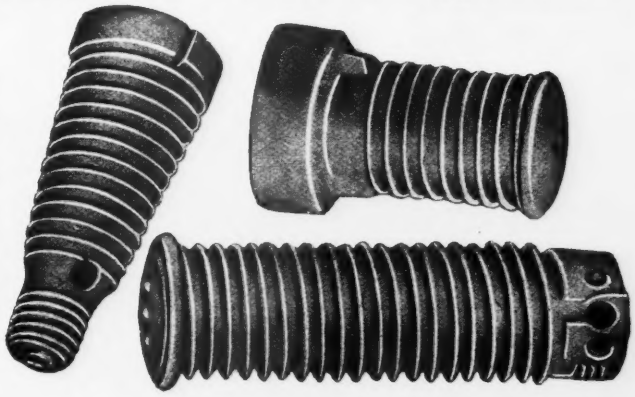

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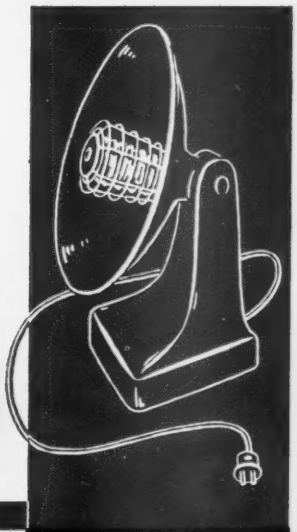

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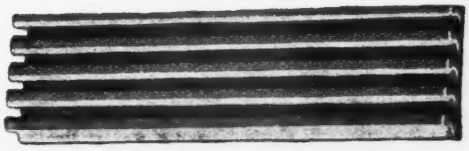

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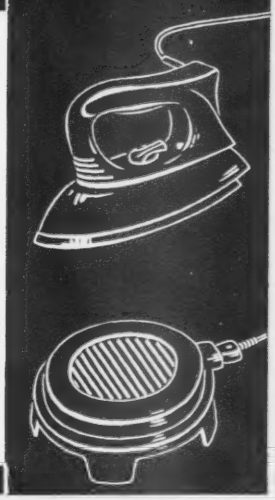

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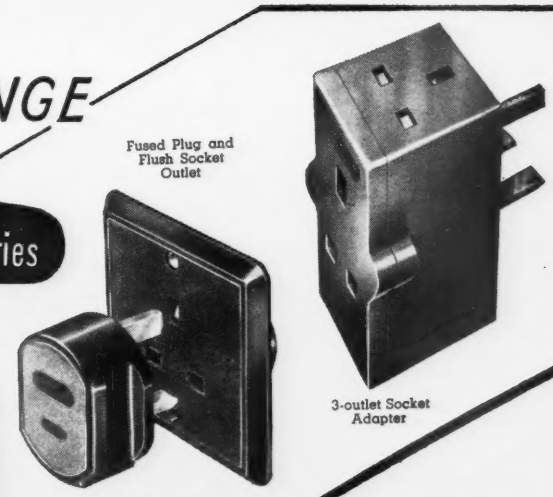

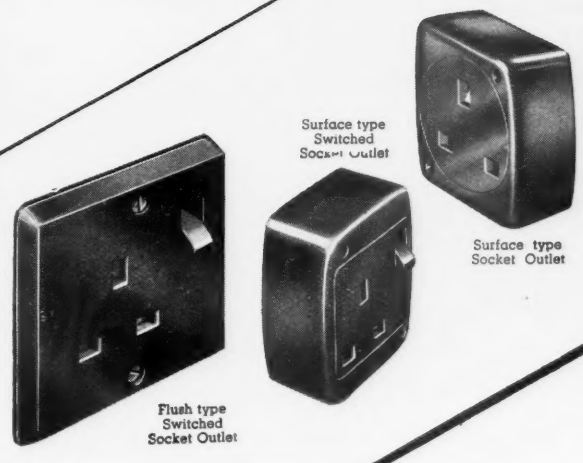

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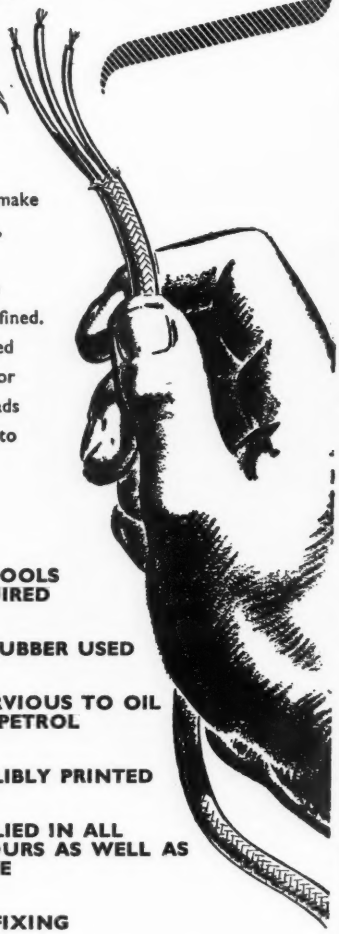
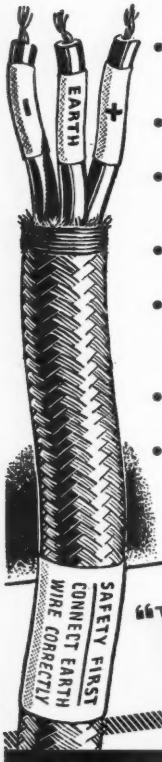
You KNOW, but do your customers know?



To follow the "Safety First" recommendation, make sure your electrical leads, whether to Domestic Appliances or to Machine Tools, etc., are clearly defined. "Viskrings" simply slipped over the core-wires and/or the outer casing of the leads do the job and put an end to confusion or doubt.



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- SELF-FIXING
- DO NOT INCREASE DIAMETER OF LEAD

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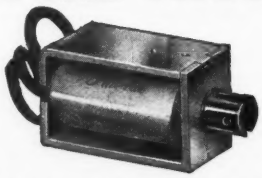

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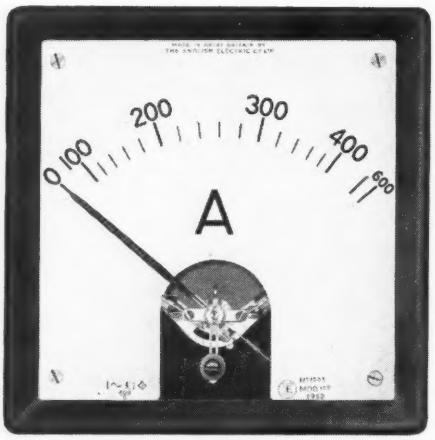

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indicating instruments

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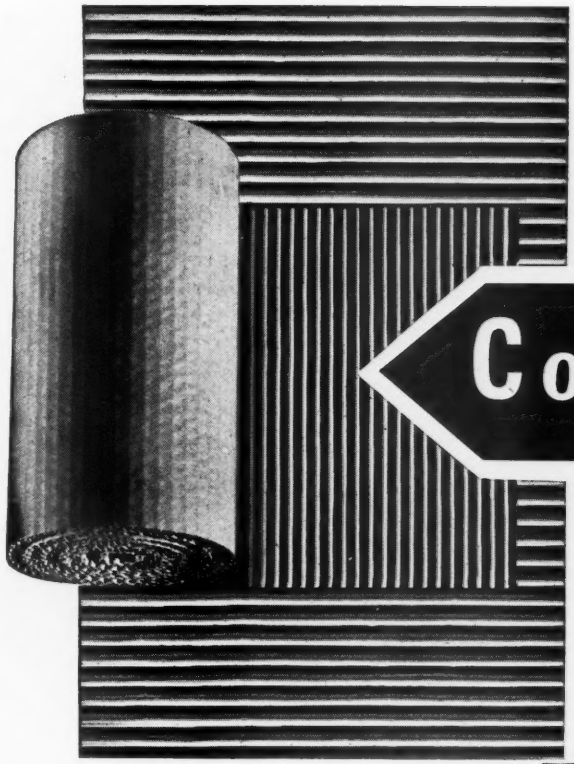

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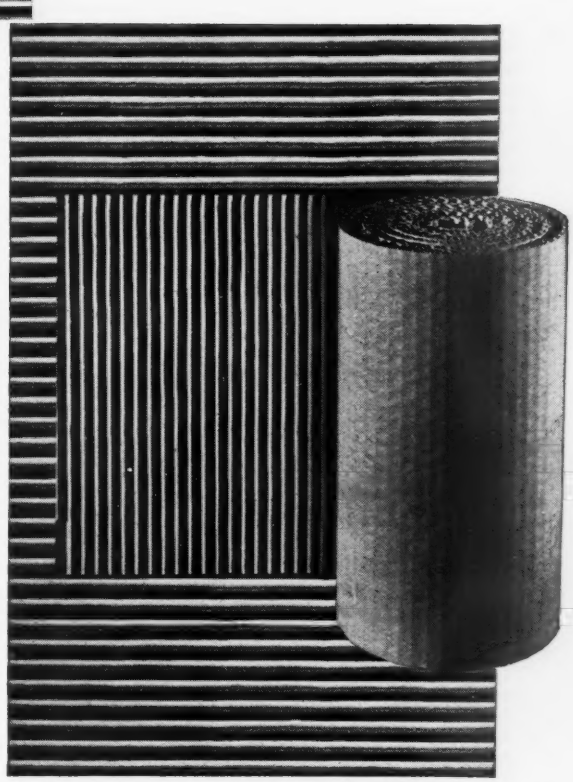

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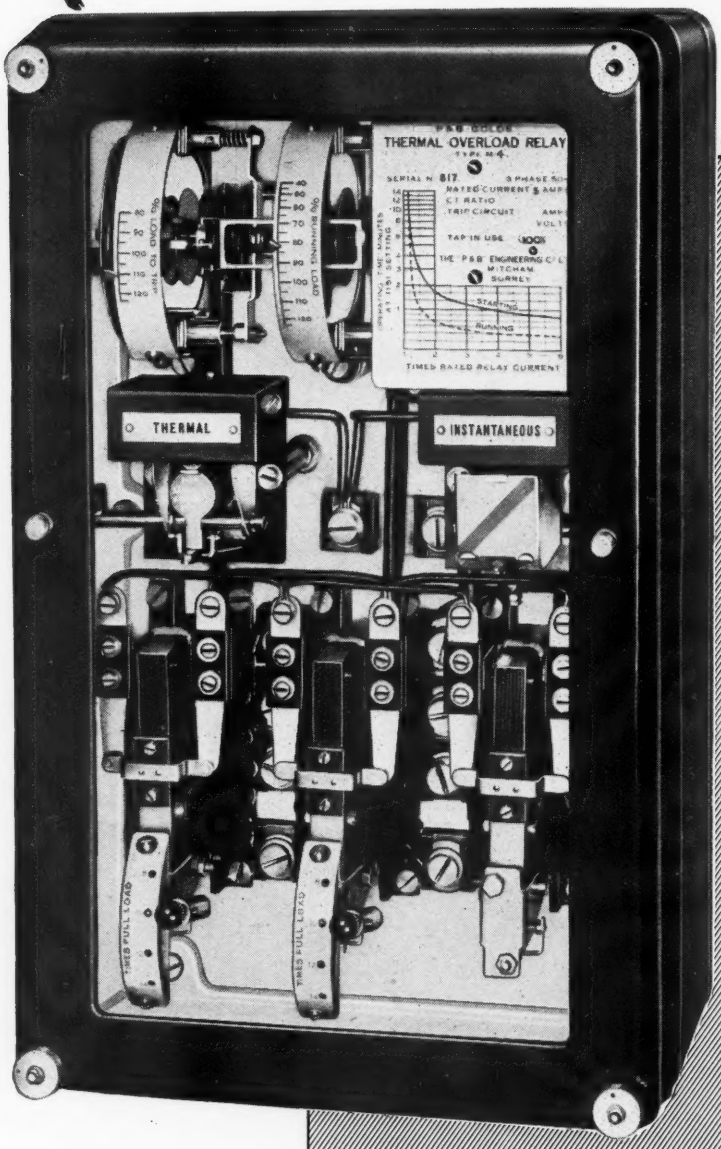

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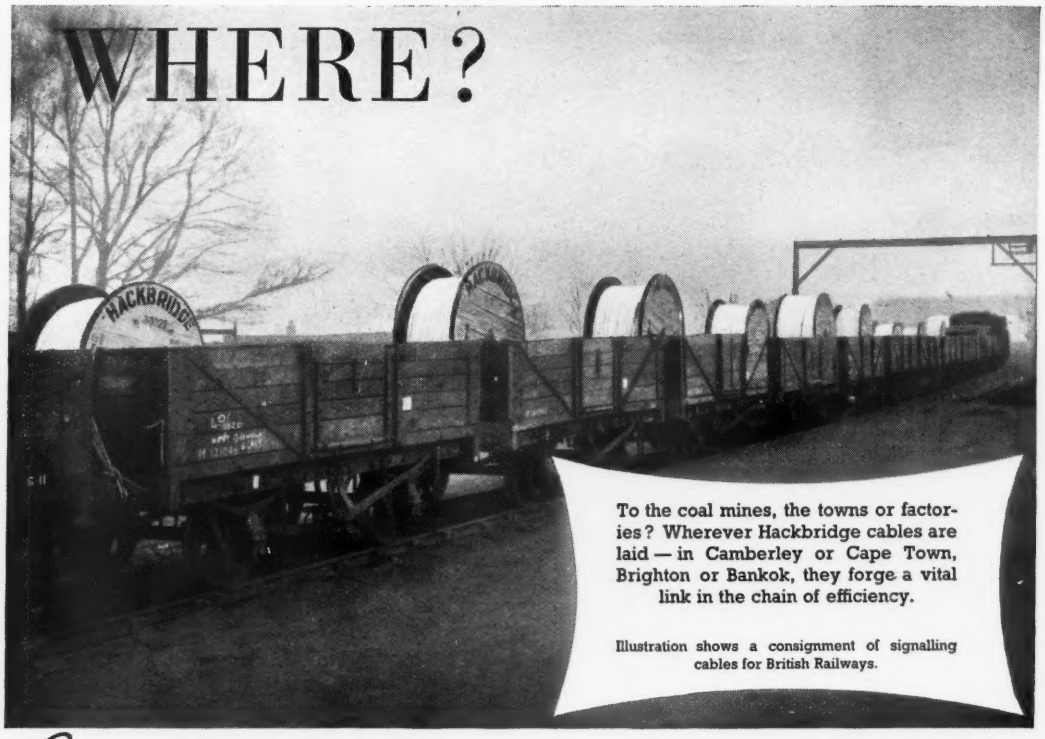

To the coal mines, the towns or factories? Wherever Hackbridge cables are laid — in Camberley or Cape Town, Brighton or Bankok, they forge a vital link in the chain of efficiency.

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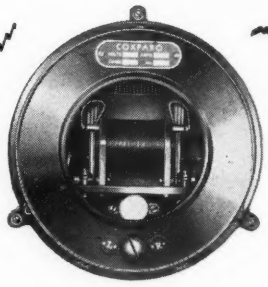
COXPARO *automatic* REGULATOR



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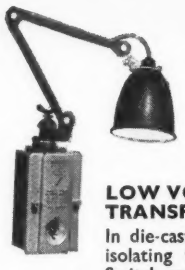

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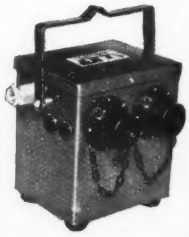

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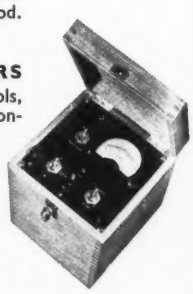

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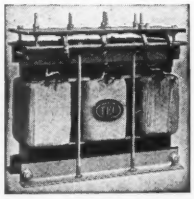

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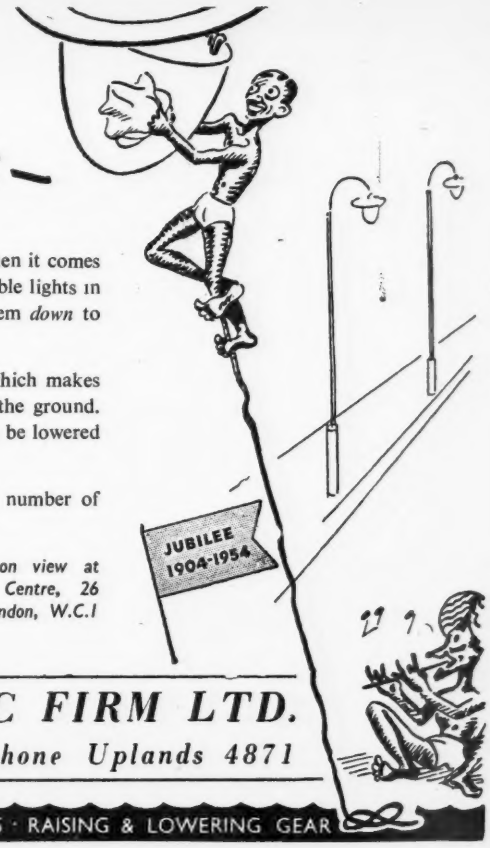

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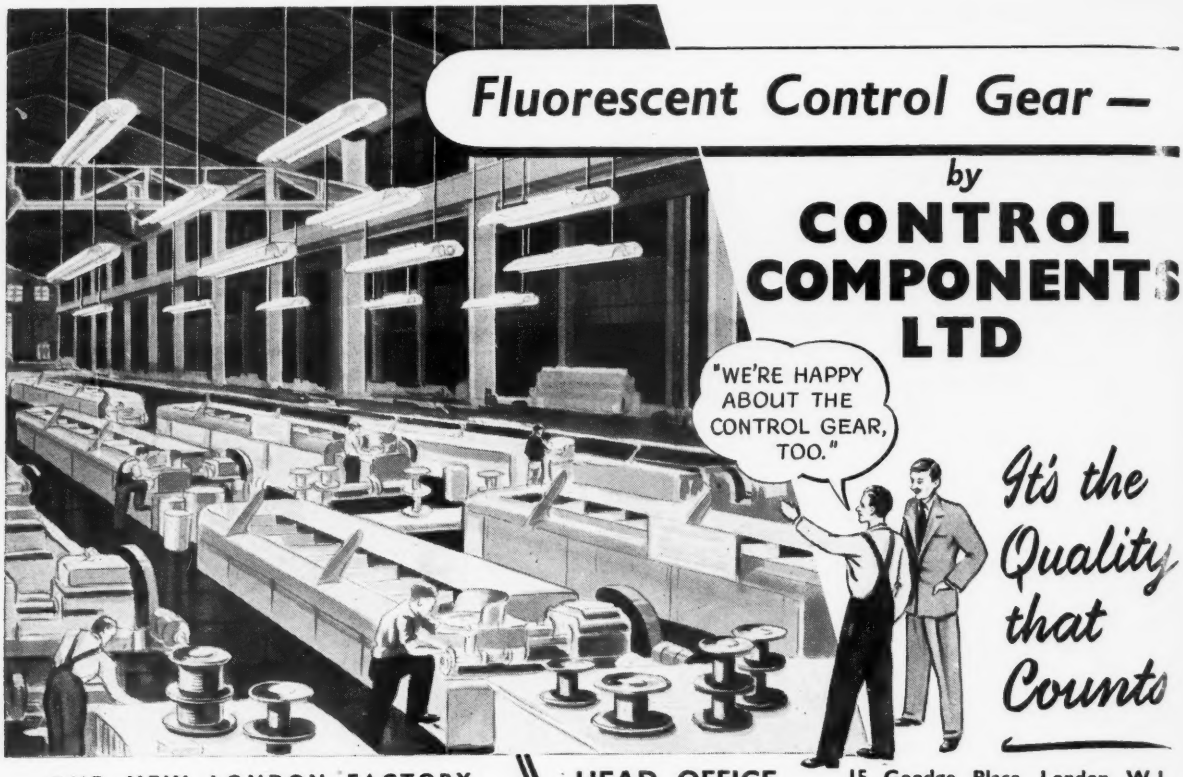

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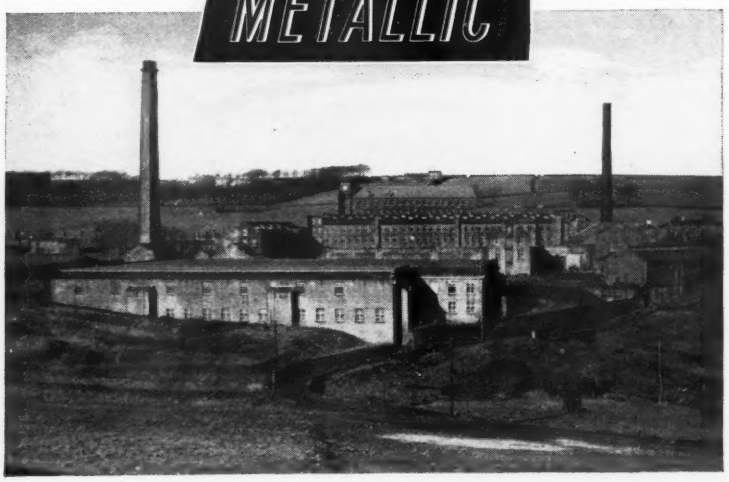

It may be a School, it may be a Factory — a Power Station or a Housing Estate, but more often than not the electrical specification will be — METALLIC.

This Yorkshire Mill is no exception, being fitted throughout with METALLIC Conduit and Fittings — unequalled for quality and consistent accuracy.

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Electrical Contractors for this important installation : A. R. Farrar & Co. Ltd.

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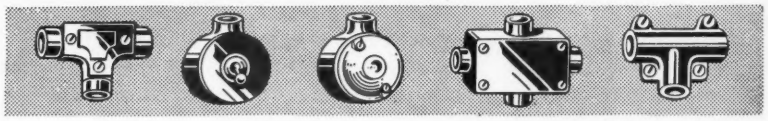

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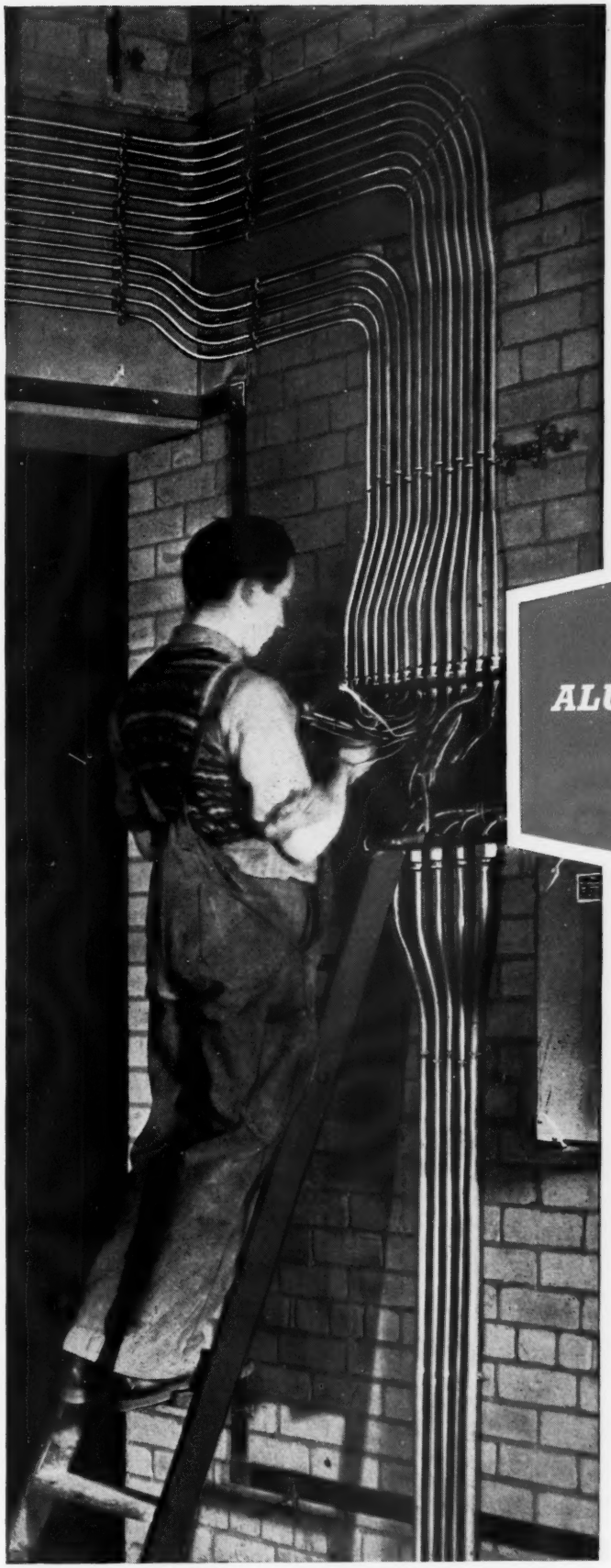

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and yet...
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TO DAMAGE

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. . . the cable with a conduit sheath

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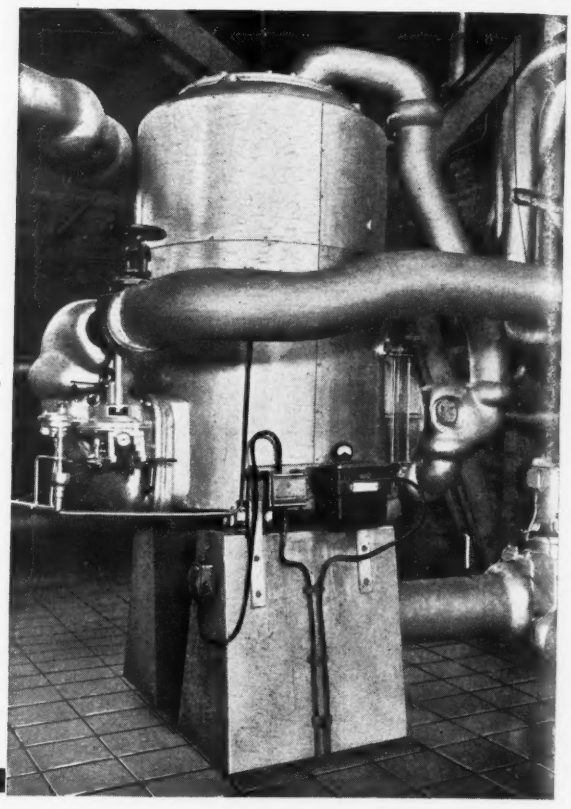

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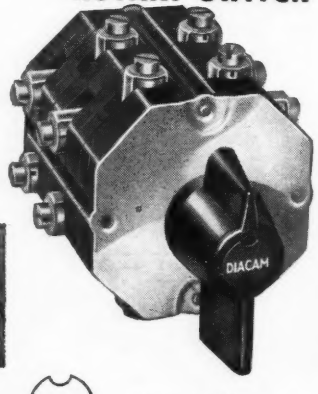
This 30-amp. rotary switch has solid silver contacts and a double-break on each pole, ensuring maximum efficiency and absolute safety under all conditions. Available in most sequences for either single or multi-pole switching.



This shows the patent terminal clamp securing two conductors

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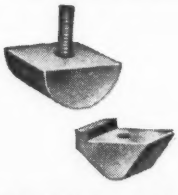
SWITCH AND CONTROL GEAR SPARES

CONTROLLER FINGER TIPS



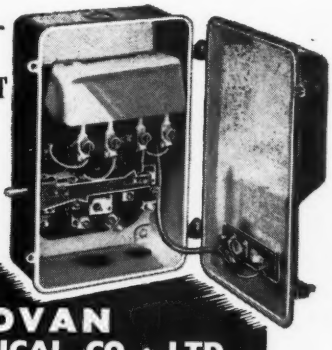
Large range available

Many sizes stocked

SYNTHETIC CARBON AND ENGINEERING CO. LTD.

Dept. "C," Cumberland Road
Stanmore · Middlesex
Phone: WORDSWORTH 1240-4200

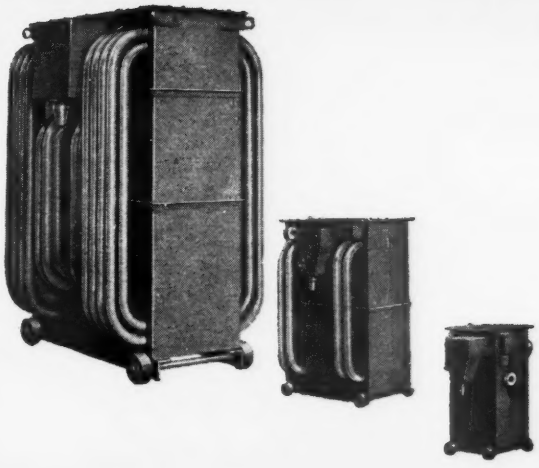
FOR QUALITY-FIRST SWITCH, FUSE and MOTOR CONTROL APPARATUS



The DONOVAN ELECTRICAL CO · LTD
GRANVILLE ST. · BIRMINGHAM, 1

TRANSFORMERS

AUSWAL PRODUCTS
REG. TRADE MARK



WE MANUFACTURE

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UP TO

500 KVA

FOR INDUSTRIAL AND DISTRIBUTIONAL APPLICATIONS

- PORTABLE TRANSFORMERS
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- RECTIFIER UNITS TO CUSTOMER'S SPECIFICATION

AUSTIN WALTERS & SON, LTD
TRANSFORMER DEPT.
AYRES ROAD, OLD TRAFFORD
MANCHESTER · 16.

Phone: TRAFFORD 1827/8 Grams: "OHMIC, MANCHESTER 16"

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use the *New*

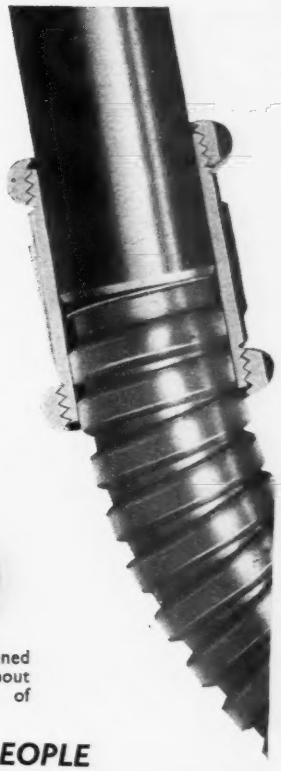
ABCON conduit coupling

(Approved by the London Electricity Board)

Just slide on the Abcon fitting, tighten up, and the joint is made.

The greatest advance in conduit technique for years. The new ABCON conduit coupling is one of the most important advances that this field of electrical work has seen for many years.

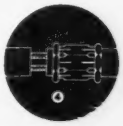
HOW IT WORKS. Tightening of the taper-threaded nut tightly contracts the slotted end of the ABCON fitting on to the conduit.



For joining rigid to flexible conduit (of same outside diameter as rigid conduit).

For joining rigid to rigid (no screwing of conduit required)

Supersedes inspection elbows. Sound bonding.



Joints may be opened at any point without dismantling run of conduit.

ABBOFLEX LIMITED — *THE FLEXIBLE CONDUIT PEOPLE*
FERRY ROAD, TEDDINGTON, MIDDLESEX **TELEPHONE KINGSTON 9159**

Heating water for industry is a responsible job

—INSTALL G.E.C. WATER HEATERS

FOR EFFICIENCY AND RELIABILITY

600 gals. 54 kW.

Two 300 gal. 27 kW. G.E.C. Water Storage Heaters installed in an ablution block of a large engineering works.

Whatever the quantity of hot water required, however complicated the system, you'll find G.E.C. has just the right equipment to solve the problem. Cleaner, economical and thoroughly reliable, G.E.C. Water Heaters are ideal for supplying hot water for process or ablution purposes. Consult G.E.C. on all your water heating problems.

G.E.C. **INDUSTRIAL ELECTRIC WATER HEATERS**

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON W.C.2

CLASSIFIED ADVERTISEMENTS

ADVERTISEMENTS are accepted up to **First Post on Monday** of the week of issue, and should be addressed to Classified Advertisement Department, Dorset House, Stamford Street, London, S.E.1.

CLASSIFIED advertisements are PREPAID at 3/- per line (approx. 6 words) per insertion. Where an advertisement includes a Box Number this counts as two words and carries an additional charge of 1/-.

DISPLAYED:—£2 per inch, per insertion. Cheques and Postal Orders should be crossed and made payable to ELECTRICAL REVIEW PUBLICATIONS LTD.

SITUATIONS WANTED:—Three insertions under this heading can be obtained for the price of two if ordered and prepaid with the first insertion.

REPLIES to Box Numbers should be addressed to the Box Number in the advertisement, c/o ELECTRICAL REVIEW, Dorset House, Stamford Street, London, S.E.1, but if not to be delivered to any particular firm or individual they should be accompanied by instructions to this effect, addressed to the Manager of the ELECTRICAL REVIEW. Replies in such cases cannot be returned. The name of an advertiser using a Box Number will not be disclosed.

Original testimonials should not be sent with applications for employment

OFFICIAL NOTICES, TENDERS, ETC.

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

Dundee Area

TENDERS are invited for the supply, erection and commissioning at Carolina Port Generating Station, Dundee, of the following:—

Two 150,000-lb./hour Steam Generating Units and all ancillary apparatus; Steam Receiver and Steam, Exhaust, Feed Water, Blowdown and Drain Piping; Modifications to Bunkers, Coal and Ash Handling Plant, etc.

Tender documents and drawings may be obtained on application to the undersigned on payment of five guineas, which will be refunded on receipt of a bona fide tender (which is not subsequently withdrawn) and the return of all documents.

Tenders should be delivered to the undersigned, together with all technical information required, in a sealed registered package marked "Confidential," not later than 12 noon on Monday, 20th September, 1954.

The Board do not bind themselves to accept the lowest or any tender.

P. PHILIP,
M.I.Mech.E., M.I.E.E.,
Area Manager.

7, Dudhope Crescent Road,
Dundee.
June, 1954. 3770

BOROUGH OF ILFORD

Main Drainage Scheme

Roden Street Pumping Station

Supply of Ancillary Plant and Equipment

QUOTATIONS are invited for the supply of the following equipment for a Sewage Pumping Station to be erected at Roden Street, Ilford:—

1. Diesel Alternator Set.
2. Flow Recorders (Venturi Tube).
3. Overhead Runway, Block and Trolley.
4. Spun C.I. Pipe Rising Mains.
5. Valves and Penstocks.
6. Control Panels, Switchgear and Starters.

Documents may be obtained from the Borough Engineer on receipt of a deposit of £2 2s., which will be returned on receipt of a bona fide quotation not subsequently withdrawn. Suppliers should indicate for which item or group of items they wish to quote.

Quotations are to be delivered in the envelope provided by or before the first post on 28th July, 1954.

The Council do not undertake to accept the lowest or any quotation.

Town Hall, Ilford, Essex.
June, 1954. 3705

METROPOLITAN BOROUGH OF WANDSWORTH

Street Lighting

TENDERS are invited for the supply and erection of Group "B" Standard Street Lighting.

Tender documents, obtainable from the Borough Engineer at the undermentioned address, must be returned to me by noon, Wednesday, 7th July, 1954.

R. H. JERMAN,
Town Clerk.
Municipal Buildings,
Wandsworth,
London, S.W.18. 3779

COUNTY BOROUGH OF SOUTHEND-ON-SEA

Electrical Installation

TENDERS are invited for the new Electrical Installation at (a) Bournemouth Park Junior and Infants' Schools, Bournemouth Park Road, Southend-on-Sea, and (b) West Leigh Primary School, Ronald Hill Grove, Leigh-on-Sea.

General conditions may be inspected and copies of form of tender, plans and specification obtained on application to the Borough Architect, 30, Alexandra Street, Southend-on-Sea, on payment of a deposit of £2 for each of (a) and (b) above, which will be refunded on receipt of a bona fide tender or the return of all loaned documents.

Sealed tenders addressed to the undersigned and endorsed (a) "Bournemouth Park School, Electrical Installation," and (b) "West Leigh School, Electrical Installation," are to be delivered to this office before 12 noon on (a) Monday, 5th July, 1954, and (b) Monday, 19th July, 1954.

No tender will be received except in the special envelope provided, which shall not bear any name or mark indicating the sender.

The Corporation do not bind themselves to accept the lowest or any tender.

ARCHIBALD GLEN,
Town Clerk. 3751

DURHAM COUNTY COUNCIL

Education Committee

THE Education Committee is prepared to receive sole tenders from Electrical Engineers for the following works:—

Houghton-le-Spring Grammar School:
Electrical Installation.

Blaydon West County School:
Electrical Installation.

Applications for the form of tender and specifications of work are to be sent to G. R. Clayton, Esq., F.R.I.B.A., County Architect, Court Lane, Durham, not later than 30th June, 1954.

No pledge is given to accept the lowest or any tender.

J. K. HOPE,
Clerk of the County Council.

Shire Hall,
Durham.
14th June, 1954. 3777

BOROUGH OF STAMFORD

TENDERS are invited for the supply and delivery of 50 Electric Cookers. Specification and memorandum as to tenders may be obtained from the Borough Engineer and Surveyor, Town Hall, Stamford, Lincs.

Tenders to be received by the undersigned not later than Tuesday, 6th July, 1954.

The Council does not bind itself to accept the lowest or any tender.

H. G. WHEWAY,
Town Clerk.

Town Hall,
Stamford.
13th June, 1954. 3754

METROPOLITAN BOROUGH OF WANDSWORTH

Sodium Lamps

TENDERS are invited for the supply of 45 and 60-watt Sodium Lamps and jackets.

Tender documents, obtainable from the Borough Engineer at the undermentioned address, must be returned to me by noon, Wednesday, 7th July, 1954.

R. H. JERMAN,
Town Clerk.
Municipal Buildings,
Wandsworth,
London, S.W.18. 3778

SITUATIONS VACANT

The engagement of persons answering these advertisements must be made through the Local office of the Ministry of Labour and National Service, etc., if the applicant is a man aged 18-64 or a woman aged 18-59 inclusive, unless he or she or the employer is excepted from the provisions of The Notification of Vacancies Order, 1952.

CENTRAL ELECTRICITY BOARD, FEDERATION OF MALAYA

DEPUTY STATION SUPERINTENDENT required by the above Board. Option of appointment either (a) on agreement for 3 years with prospect of permanency or (b) on contract for 3 years with gratuity of £200/£280 for each year's service.

Salary, etc., according to qualifications and experience in scale £1,904 rising to £2,100 a year. In addition, allowances ranging between £210 and £630 a year payable to married men according to salary and dependants.

Opportunity of terminating appointment at end of one year if so desired.

Candidates must have wide experience of station maintenance and operation and preferably have held a similar position in a steam power station of not less than 80-MW capacity, or as a charge engineer for at least 5 years on a station of not less than 120-MW capacity.

Write to the Crown Agents, 4, Millbank, London, S.W.1. State age, name in block letters, full qualifications and experience, and quote M2C/28769/EF.

3752

BRITISH ELECTRICITY AUTHORITY

Midlands Division

JUNIOR ENGINEER is required at Hams Hall "B" Power Station, Nr. Birmingham. N.J.B. service conditions, superannuable appointment, salary within Schedule A, Grade K15 of the Agreement, £545 per annum.

Applicants should have received a sound technical training and should preferably have had experience in a large power station. Appropriate technical qualifications will be an advantage.

Apply, quoting vacancy No. 693MD, on form AE6, available from the Establishments Officer, 53, Wake Green Road, Moseley, Birmingham 13, by 10th July, 1954. 3772

YORKSHIRE ELECTRICITY BOARD

No. 7 (Grimsby) Sub-Area

SENIOR ASSISTANT (Billing and Rentals). Applicants should have a thorough knowledge of billing procedure in respect of domestic, commercial and industrial consumers, and the maintenance of debtors controls of all types, including hire purchase. They should be conversant with punched card methods of billing and have experience in the supervision of staff. The possession of an accountancy qualification will be an advantage.

Salary N.J.C. Grade 5, £670/£20/£730 per annum.

GAINSBOROUGH DISTRICT

SENIOR SERVICE CENTRE ASSISTANT. Applicants should have had previous experience in service centre work, including the sale of electrical appliances, hire purchase agreements, handling of enquiries, etc., and must be capable of advising consumers on any matter relating to the use of electricity in their homes. A knowledge of window display will be an advantage.

Salary N.J.C. Grade 2, £485/£545 p.a.

SALES REPPRESENTATIVE. Applicants will be required to give advice within well-defined instructions and under close supervision to both urban and rural consumers in respect of new supplies and sales of domestic and agricultural equipment and to advise customers on all types of domestic and agricultural installations and prepare estimates in this connection.

Salary N.J.C. Grade 1, £400/£490 per annum.

SCUNTHORPE DISTRICT

DEMONSTRATOR. Applicants must have had two years' domestic science training at a recognised college and have obtained the E.A.W. Certificate. Previous experience of demonstrating to the public will be an advantage.

Salary N.J.C. Grade 1, £400/490 p.a.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 7 (Grimsby) Sub-Area, Yorkshire Electricity Board, Moss Road, Grimsby, not later than 8th July, 1954.

SCUNTHORPE DISTRICT

JOINTER or JOINTER (E.H.T.). N.J.I.C. rate of pay and conditions of service, the present rate for Jointer being 3s. 7d. per hour, and for Jointer (E.H.T.) 3s. 9d. per hour for a 44-hour, 5-day week.

A house may be available in Scunthorpe for the successful applicant.

GRIMSBY DISTRICT

METER REPAIRER (Mechanician). N.J.I.C. rate of pay and conditions of service, the present rate being 3s. 9d. per hour for a 44-hour, 5-day week.

Applications, giving full particulars of age and experience, should be forwarded to the Manager, No. 7 (Grimsby) Sub-Area, Yorkshire Electricity Board, Moss Road, Grimsby, not later than 8th July, 1954.

No. 3 (Sheffield) Sub-Area

SHEFFIELD NORTH AND SOUTH DISTRICTS

ASSISTANT INSTALLATION ENGINEER. Applicants should possess a sound technical training, have served a full apprenticeship with a recognised firm of electrical contractors, and subsequently have a wide experience of all classes of electrical contracting work covering installations for lighting, heating and power. The duties of the post include the preparation of specifications, estimates and tenders for all classes of installation work. Application of I.E.E. Wiring Regulations and other relevant work, including knowledge of rewinding and repair of electrical machinery. Layout and supervision of installations on site. Use of modern methods of estimating. Control of staff and workpeople.

Salary N.J.B. Class L, Grade 12, £667/£692 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 3 (Sheffield) Sub-Area, Yorkshire Electricity Board, Commercial Street, Sheffield, not later than 8th July, 1954.

No. 5 (Wakefield) Sub-Area

CASTLEFORD DISTRICT

INSTALLATION ENGINEER. The person appointed will be responsible for the organisation and administration of the contracting section, including the supervision of manual workers. He must be capable of preparing specifications and estimates and supervising schemes for complete installations of all types, and must have a thorough knowledge of the Electricity Supply Regulations and the I.E.E. Regulations for the Electrical Equipment of Buildings. Preference will be given to Corporate Members of the Institution of Electrical Engineers.

Salary N.J.B. Class F, Grade 8, £635/£664 per annum.

WAKEFIELD DISTRICT

GENERAL ASSISTANT DISTRICT ENGINEER. Applicants must have had a sound practical training with experience in the construction, operation and maintenance of H.V. and M.V. overhead and underground distribution networks, substation plant and ancillary equipment.

Applicants must hold a current driving licence, be prepared to reside in the district, and undertake standby duties.

Applicants must have at least a Higher National Certificate in Electrical Engineering or equivalent qualifications.

Salary N.J.B. Class F, Grade 11, £548/£565 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 5 (Wakefield) Sub-Area, Yorkshire Electricity Board, 1a, Denby Dale Road, Wakefield, not later than 8th July, 1954.

No. 1 (Bradford) Sub-Area

METER REPAIRERS (Mechanician) required in the Meter Testing Section at Bradford. Rate of pay 3s. 9d. per hour; conditions of service in accordance with N.J.I.C. for the Electricity Supply Industry.

Applications, giving full details of age, and experience, should be forwarded to the Manager, No. 1 (Bradford) Sub-Area, Yorkshire Electricity Board, 45-53, Sunbridge Rd., Bradford, not later than 8th July, 1954. 3791

FOREMAN ELECTRICIAN

required by the SIERRA LEONE GOVERNMENT RAILWAY DEPARTMENT for one tour of 18 to 24 months. Commencing salary, etc., according to age and experience in scale £798 rising to £1,178 a year, with gratuity at rate of £100/£150 a year. British Railways staff may be appointed on secondment terms on salary, etc., according to age and experience in scale £742 rising to £1,092 a year. Outfit allowance £60. Free passages for officer, wife and up to two children up to age of 10 or grant up to £150 a year for maintenance in U.K. Liberal leave on full salary.

Candidates, between 25 and 40 years, must have served apprenticeship and have at least 4 years' experience as a journeyman electrician. They must have experience of the maintenance and repair of all types of A.C. motors, 3-phase, 50 cycles, up to 400 volts, workshop lighting, 230 volts, single-phase, also coil and armature windings. A knowledge of train lighting systems is essential.

Write to the Crown Agents, 4, Millbank, London, S.W.1. State age, name in block letters, full qualifications and experience, and quote M2C/30468/EF. 3709

VACANCIES FOR TEMPORARY ASSISTANT ENGINEERS

APPLICATIONS are invited from University Graduates in Electrical Engineering or in Science subjects (which must include Experimental Physics) for posts as TEMPORARY ASSISTANT ENGINEER in the Department of Posts and Telegraphs, Dublin.

Age limits 21-30 years.

Salary: Minimum £540 per annum, which will be increased in the case of candidates with special qualifications or experience.

Permanent Employment and Prospects: Temporary Assistant Engineers can obtain permanent and pensionable Assistant Engineer posts by way of a Civil Service Commission competition held each year. The present salary scale for these posts goes to £945 and credit is given in the starting pay for Temporary Assistant Engineer or other approved practical experience. After three years' satisfactory service permanent Assistant Engineers will be promoted to the grade of Executive Engineer, the present salary scale of which is £773-£1,060.

Further particulars may be obtained from the Engineer-in-Chief, Leitrim House, Dublin. 3651

EASTERN ELECTRICITY BOARD

APPLICATIONS are available for the following appointments in the Norfolk Sub-Area:

SUB-AREA HEADQUARTERS, NORWICH

SENIOR ASSISTANT ENGINEER (Commercial) (87/54R.). Candidates should have had a sound experience in, and must be conversant with, all matters connected with a commercial organisation of a large but mainly rural area. They should also be conversant with sales and all aspects of service to consumers. Preference will be given to candidates who are Corporate Members of the Institution of Electrical Engineers.

Salary will be in accordance with Class J, Grade 4 of the National Joint Board Salary Agreement, commencing at £1,026.

Apply to the Manager, Norfolk Sub-Area, Eastern Electricity Board, 4, Duke Street, Norwich, Norfolk.

YARMOUTH DISTRICT

DEMONSTRATOR (40/54R.). Candidates should have had domestic science training including electrical housecraft, should preferably hold the E.A.W. Certificate and be competent to plan and give cookery demonstrations, including lectures and advice to consumers on the utilisation of domestic electrical appliances. Previous experience in an electricity service centre is desirable.

Salary will be in accordance with Grade 1 (£400 + £20 to £480 + £10 to £490) of the National Joint Council Salary Agreement, although progress beyond £440 will be subject to a certificate that the person concerned is capable of undertaking all the duties of the grade.

Apply to the District Manager, Great Yarmouth, Eastern Electricity Board, Regent Road, Great Yarmouth, Norfolk.

Future salaries and conditions of service for both these appointments will be in accordance with agreements made from time to time by the appropriate negotiating bodies.

The successful candidates will be required to contribute to a superannuation scheme and may be required to undergo a medical examination.

Applications by letter, stating age, education, qualifications and experience with details of present appointment and salary, should be submitted to the Manager concerned within fourteen days of the appearance of this advertisement. 3782

DERBY EDUCATION COMMITTEE

Derby Technical College

Principal: T. Heap, Ph.D., M.Sc., F.R.I.C.

APPLICATIONS are invited for the post of LECTURER in the Electrical Engineering Department. Candidates, who must have had a sound industrial experience and some teaching experience, will be expected to teach to Post Higher National Certificate and Final Degree level. Salary in accordance with the Burnham Scale for Lecturers, £940 × £25 to £1,040.

Application form and details of the post can be obtained from the Principal, Derby Technical College, Normanton Road, Derby, by whom completed applications should be received within two weeks of the appearance of this advertisement.

C. MIDDLETON,
Director of Education.

Education Office,
Becket Street, Derby.
17th June, 1954. 3774

AIR MINISTRY WORKS DEPARTMENT

requires in London and Provinces ELECTRICAL ENGINEERING DRAUGHTSMEN in Designs Branch. Applicants should have several years' experience in preparation of schemes for illumination and electrical equipment of buildings or in electrical distribution, H.V. and M.V. Appointments carry liability for overseas service for which allowances payable.

Salaries up to £780 p.a., starting pay dependent on age, qualifications and experience. Overtime or extra duty allowance payable. Reasonable promotion prospects. Posts temporary and non-pensionable but have long-term possibilities. Competitions held periodically to fill established vacancies.

Applications from natural-born British subjects only, quoting A/S, and stating age, qualifications and previous appointments, giving dates and stating type of work done, to Air Ministry, S.2(h)/NA, Cornwall House, Stamford Street, London, S.E.1. 3255

SENIOR SCIENTIFIC OFFICERS; SCIENTIFIC OFFICERS; PATENT EXAMINER AND PATENT OFFICER CLASSES

THE CIVIL SERVICE COMMISSIONERS invite applications for pensionable appointments. Applications may be accepted up to 31st December, 1954, but early application is advised as an earlier closing date may eventually be announced. Interview boards will sit at frequent intervals. The Scientific posts cover a wide range of scientific research and development in most of the major fields of fundamental and applied science. In biological subjects the number of vacancies is small: individual vacancies exist at present for candidates who have specialised in palæobotany, foraminifera, malacology and lichenology. The Patent posts are in the Patent Office (Board of Trade) and Ministry of Supply.

Candidates must have obtained a university degree with first or second class honours in an appropriate scientific subject (including engineering) or in mathematics, or an equivalent qualification; or, for Scientific posts, possess high professional attainments. Candidates for Senior Scientific Officer posts must in addition have had at least three years' post-graduate or other approved experienee. Candidates for Scientific Officer and Patent posts taking their degrees in 1954 may apply before the result of their degree examination is known.

Age limits: Senior Scientific Officers, between 26 and 31, but specially suitable candidates under 26 may be admitted. For Scientific Officers and Patent Classes, between 21 and 28 during 1954 (up to 31 for permanent members of the Experimental Officer class).

Salary (London): Senior Scientific Officers (men) £975-£1,150; (women) £845-£1,025; Scientific Officers (men) £470-£855; (women) £470-£750; Patent Examiner and Patent Officer classes (men) £440-£760 (rates under review). Women's rates somewhat lower. Somewhat lower rates in the Provinces.

Further particulars from the Civil Service Commission, Scientific Branch, Trinidad House, Old Burlington Street, London, W.1, quoting No. S.53/54 for Senior Scientific Officers and S.52/54 or S.128/54 for the other posts. 3771

BRITISH ELECTRICITY AUTHORITY

South West Scotland Division

General Assistant Engineer System Operation Department

A VACANCY occurs for a GENERAL ASSISTANT ENGINEER in the Control Room, Divisional Headquarters, 168, Broomhill Drive, Glasgow, W.1. Higher National Certificate or equivalent experience in a Power Station will be advantageous.

The salary for the superannuable post is in Grade 8, Class AX, Schedule C, of the National Joint Board Agreement, £501/£639 per annum. The duties—day work— are statistical.

Applications on Form AE6, which may be obtained from Divisional Headquarters or from any Divisional Office of the Authority, should be forwarded to me at the above address before 5th July, 1954.

A. CHRISTIANSON,
15th June, 1954. Divisional Secretary.
3786

SOUTH WALES ELECTRICITY BOARD

ASSISTANT CIVIL ENGINEER required, to be responsible to the Board's Civil Engineer. Successful candidate will be responsible for civil engineering work mainly in the Eastern part of the Board's area.

The work will include the carrying out of contracts both by direct labour and outside contractors, preparation of estimates and specifications, reports and advice on land and property for substations, offices and showrooms and supervision of the preparation of working drawings.

Salary, Class AX/CX, Grade 5 (£649/£835), of N.J.B. Schedule.

Applications stating age, present position and salary, qualifications, experience and three referees, to be addressed to the Secretary, to arrive by 3rd July, 1954.

D. G. DODDS,
Secretary.
South Mellons,
Cardiff. 3787

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

APPLICATIONS are invited from suitably qualified engineers for the following positions:—

SHIFT CONTROL ENGINEER, Longford Power Station, Coventry (Vacancy No. 85/54/ER.). Applicants should have had a sound training and practical experience in a modern power station. The possession of technical qualifications is desirable.

Salary will be in accordance with Class G, Grade 10 (£608-£630 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications 28th June, 1954.

JUNIOR ENGINEER, Avon Power Station, Warwick (Vacancy No. 77/54/ER.). Applicants should be suitably qualified engineers with some experience in power station operation.

Salary for this appointment is £445 per annum within Class E, Grade 14, of the National Joint Board Agreement.

Closing date for receipt of applications 5th July, 1954.

ASSISTANT SHIFT CHARGE ENGINEER, Avon Power Station, Warwick (Vacancy No. 87/54/ER.). Applicants should have obtained Higher National Certificate in Electrical and/or Mechanical Engineering and have had experience in the operation of generating stations.

Salary for this appointment will be within Class E, Grade 9 (£587-£600 per annum).

Closing date for receipt of applications 5th July, 1954.

These appointments wil be pensionable within the terms and provisions of the British Electricity Authority and Area Boards Superannuation Scheme.

Applications should be submitted on the official form AE6/ACT which may be obtained from the Divisional Establishments Officer, British Electricity Authority, P.O. Box 25, Barker Gate, Nottingham, and should be returned to the undersigned by the date stated. Please quote vacancy number.

L. F. JEFFREY,
Divisional Controller. 3670

ROYAL AIRCRAFT ESTABLISHMENT TECHNICAL COLLEGE

Farnborough, Hants

ROYAL AIRCRAFT ESTABLISHMENT TECHNICAL COLLEGE (Selective, Day) requires DEMONSTRATOR IN MECHANICAL ENGINEERING. Candidates should hold university degree or equivalent, preferably with some industrial experience, and be able to assist in organisation, preparation and control of work in laboratories under guidance of Senior Lecturers. A little teaching may be involved. Facilities for research and further study may be available.

Salary on Burnham Technical Scale, £375 × £18 to £630 plus £40 special addition and usual allowances, resulting in salary of £500 plus increments for experience for fully qualified man. Post subject to Teachers Superannuation Acts.

Details and forms from Principal, to whom completed forms must be returned within 14 days of this notice. 3649

VERSATILE ENGINEER REQUIRED

WE want a good, energetic technical Electrical Engineer. This situation demands a works trained, fully experienced man with a modern outlook, capable of making decisions and taking responsibility. Above all, he must not have a "single track mind" and must have commercial vision.

Duties include design and development of all types of automatic control gear for engine-driven electric generating equipment up to 150 kVA, preparation of detailed technical specifications for tenders, correspondence in regard to technical queries, and compiling instruction and service manuals for a large range of sets.

An attractive salary plus bonus on trading will be paid to the right man, and a pension scheme is in operation. Our employees are aware of this advertisement.

All replies will be treated in strictest confidence. Send full details of training, experience, positions held, duties, qualifications, age and approximate salary range to—Box 3724.

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

APPLICATIONS are invited from suitably qualified engineers for the following positions:—

ASSISTANT SHIFT CHARGE ENGINEER, AVON POWER STATION, WARWICK (Vacancy No. 87/54/ER). Applicants should have obtained Higher National Certificate in Electrical and/or Mechanical Engineering and have had experience in the operation of Generating Stations

Salary for this appointment will be within Class E, Grade 9 (£587-£600 per annum), of the National Joint Board Agreement.

Closing date for receipt of applications, 5th July, 1954.

ASSISTANT ENGINEER (INSTRUMENTS), FREEMEN'S MEADOW POWER STATION, LEICESTER (Vacancy No. 93/54/ER). Applicants should have the Higher National Certificate or equivalent together with sound practical experience in the maintenance of instruments in a P.F. fired Generating Station.

Salary for this appointment will be within Class H, Grade 10 (£641-£667 per annum), of the National Joint Board Agreement.

Closing date for receipt of applications, 12th July, 1954.

These appointments will be pensionable within the terms and provisions of the British Electricity Authority and Area Boards Superannuation Scheme.

Applications should be submitted on the official form AE6/ACT, which may be obtained from the Divisional Establishments Officer, British Electricity Authority, P.O. Box 25, Barker Gate, Nottingham, and should be returned to the undersigned by the date stated. Please quote vacancy number.

L. F. JEFFREY,
18th June, 1954. Divisional Controller.
3785

BRITISH ELECTRICITY AUTHORITY

London Division

APPLICATIONS are invited for the following superannuable posts. Conditions of service in accordance with N.J.B. Agreement, Schedule A or C. Salary includes London allowance.

SENIOR ASSISTANT ENGINEER (MECHANICAL ENGINEERING), CONSTRUCTION DEPT., DIVISIONAL HEADQUARTERS (Vacancy No. 54/471). Applicants should have considerable experience in generating station construction work, including the preparation of station and system layouts and specifications for all types of mechanical plant, handling of contracts and supervision of site erection. Some station operating experience would be an advantage. Preference will be given to engineers with an engineering degree or Corporate Membership of the Institution of Mechanical Engineers. Salary: Class AX, Grade 1 = £1,018 10s./£1,153 p.a., rising ultimately to Class EX, Grade 1= £1,282 p.a.

SHIFT CHARGE ENGINEER, HAMMERSMITH GENERATING STATION (Vacancy No. 54/472). Applicants should have a sound technical training and practical experience in the operation and maintenance of boilers, turbines and E.H.T. switchgear. Qualifications entitling to Graduate Membership of the I.E.E. or I.Mech.E. an advantage. Salary: Class D, Grade 7 = £664 13s. p.a.

Applications, quoting vacancy number, may be made on form obtainable from Divisional Secretary, British Electricity Authority, London Division, Generation House, Great Portland Street, London, W.1, and be received within 14 days of this advertisement. 3773

KENT EDUCATION COMMITTEE

Medway College of Technology

REQUIRED September, or as soon after as possible, LECTURER IN ELECTRICAL ENGINEERING to Final Engineering Degree standard. Applicants should hold a good degree and have adequate industrial experience. Facilities for research are available. Salary £940 × £25 to £1,040.

Forms of application from the Principal, to be returned to him, as soon as possible, at Medway College of Technology, Horsted, Maidstone Road, Chatham, Kent. 3755

SOUTH WEST SCOTLAND ELECTRICITY BOARD

APPLICATIONS are invited for appointments as FIRST ASSISTANT DISTRICT COMMERCIAL ENGINEER in the under-noted Districts:—

Clyde Sub-Area	...	Dumbarton District
Lanarkshire Sub-Area		Hamilton District
Dumfries & Galloway Sub-Area		Annan District
do.	do. ...	Kirkcudbright Dist.
do.	do. ...	Wigtown District

Except in the Wigtown District, the posts are on Class D, Grade 6 of the National Joint Board Agreement. Salary scale £665 to £688 per annum. In Wigtown District the post is on Class C, Grade 6, salary scale £631 to £654 per annum.

Applicants should be Engineers with commercial experience and, preferably, should hold an appropriate engineering qualification. The appointments are superannuable and may be subject to medical examination.

Forms of application, which may be obtained from the applicant's appropriate officer or the undersigned, should be completed and returned to the undersigned not later than 9th July, 1954. Applicants should indicate the District or Districts applied for.

Persons who have already submitted applications for a similar appointment need only indicate that they wish to be considered for one of the above positions.

J. MEEK,
Secretary.

62, Dalziel Drive,
Glasgow, S.1.
23rd June, 1954. 3707

SOUTH EASTERN ELECTRICITY BOARD

DEMONSTRATOR (Female), Sutton District, South Eastern Electricity Board. Salary, £400 × £20-£480 × £10-£490 p.a., plus London weighting, under N.J.C., Grade 1. Superannuable. The person appointed will be required to conduct demonstrations of domestic electrical appliances in consumers' homes and in showrooms, advise consumers and generally assist in showrooms. Preference to applicants having the E.A.W. Certificate or a recognised Domestic Science qualification.

Applications on forms from C. W. Emanuel, M.I.E.E., Sutton Manager, SEEBoard, 52, High St., Sutton, Surrey, to be returned naming 2 referees by 7th July, 1954.

CARTOGRAPHIC DRAUGHTSMAN (Male) (N.J.C.), Guildford District, South Eastern Electricity Board. Salary, £415 × £20 × £15 × £20-£470 p.a. Superannuable. Applicants should have sound general education and experience in drawing office practice is necessary.

Applications on forms from W. E. Affleck, M.I.E.E., M.Inst.F., Guildford Manager, SEEBoard, 99, High St., Guildford, Surrey, to be returned by 7th July, 1954.

JOINTER (Extra High Tension), Worthing District, South Eastern Electricity Board. Wages, 3s. 9d. per hour for 44-hour, 5-day week under N.J.I.C. Agreement.

Applications, naming 2 referees, to M. J. Mortimer, M.I.E.E., District Manager, Worthing District, SEEBoard, 56, Chapel Rd., Worthing, by 7th July, 1954.

A. L. BURNELL, Secretary.
3789

BRITISH ELECTRICITY AUTHORITY

North West, Merseyside and North Wales Division

VACANCY No. 103/54: THIRD ASSISTANT ENGINEER, No. 1 Sub-Division, Preston. Salary £649/£883 (AX/EX5). Wide experience of power station operation required.

Applications, quoting vacancy number, to Controller, British Electricity House, 825, Wilmslow Road, Manchester, 20, before 5th July, 1954. 3758

RICHMOND MAIN SEWERAGE BOARD

SHIFT ENGINEERS required with National or B.O.T. Certificate to take charge of rotary shifts. Salary £580 per annum. Successful applicants will be responsible for the operation of works plant, including 330-kW diesel alternators, pumps and air compressors.

Applications to the Board, West Hall Road, Kew Gardens, Surrey. 3710

BRITISH ELECTRICITY AUTHORITY

South Western Division

TECHNICAL STAFF VACANCIES:—

(a) SENIOR ASSISTANT ENGINEER (Civil), Generation Construction Department, Bristol. N.J.B. 1AX/CX, £970-£1,166.

(b) GENERAL ASSISTANT ENGINEER (Protection), Technical Department (Plymouth Region). N.J.B. 8AX/CX, £501-£675.

Superannuation.

Candidates for (a) should preferably be Corporate Members of the Institution of Civil Engineers, be experienced in the design and construction of heavy foundations and building works associated with modern power stations; also in the preparation of preliminary schemes and estimates, specifications, bills of quantities, in writing reports, and general control of building and civil engineering contracts.

For (b) should possess qualifications leading to A.M.I.E.E. and have served with one of the leading electrical manufacturers. They should have an interest in protective gear design, generator and switchgear testing and fault current calculators.

Applications on form A.E.6/ACT, obtainable from the Divisional Secretary, 26, Oakfield Rd., Bristol, 8, should be completed and returned by 5th July, 1954. 3757

ENGINEER TECHNICIANS

required for RADIOTHERAPEUTIC INSTITUTE in course of erection at the WESTERN GENERAL HOSPITAL, EDINBURGH,4, which will contain one 4-MeV Linear Accelerator and eight other X-ray therapy units, to assist in problems related to the maintenance, adjustment and operation of equipment used in the treatment of patients.

CHIEF ENGINEER TECHNICIAN. Salary scale £630 × £20 to £750 per annum.

SENIOR ENGINEER TECHNICIAN. Salary scale £540 × £20 (3) × £25 (1) to £625 per annum.

ASSISTANT ENGINEER TECHNICIAN. Salary scale £450 × £15 (3) × £20 (1) to £515 per annum.

Conditions of service as recommended by the Whitley Council for Health Services (P.T.B. Circular No. 28). The posts are superannuable.

Preference will be given to candidates who hold an appropriate degree or equivalent qualification. Placing on the scale will be according to experience. Previous experience with X-ray and/or high-voltage equipment essential.

The Chief Engineer must be experienced in electrical and mechanical engineering. The Senior Engineer will require to have a good knowledge of electronics.

Applications, giving qualifications and experience, with the names and addresses of three referees, to be submitted immediately to the Medical Superintendent at the Hospital. 3708

BRITISH ELECTRICITY AUTHORITY

Headquarters

BANKSIDE, London, require DRAUGHTSMEN for work on either:—

(a) Civil and Building Works in connection with outdoor Grid Substations, or

(b) Electrical Layouts and Diagrams for Grid Substations.

Salary N.J.B., Grade 6, Schedule D, £458 to £595 (inclusive), according to qualifications and experience. Pension Scheme. One Saturday morning in four on duty. Forms from D. Moffat, Director of Establishments, Winsley Street, London, W.1. Quote reference: AE/491/E.R. 3784

SOUTHERN ELECTRICITY BOARD

Meter Repairer (Mechanician)

METER Department of No. 2 (Newbury) Sub-Area. Wages as set out in the N.J.I.C. Agreement (i.e. 45.00d. per hour). N.J.I.C. conditions of service.

Experience in the repair and/or testing of all types of A.C. single-phase and polyphase electricity meters would be an advantage.

Applications, in writing, to the Sub-Area Secretary, 7, Oxford Road, Newbury, Berks, not later than July 9, 1954. 3790

MINISTRY OF TRANSPORT AND CIVIL AVIATION

Telecommunications Technical Officers, Grade III

BY arrangement with the Civil Service Commissioners applications are invited from men for at least 12 posts. Age at least 23 on 1st June, 1954. Candidates must possess (a) the Ordinary National Certificate in Electrical Engineering or (b) City and Guilds Intermediate Certificate in Telecommunications Engineering, plus City and Guilds Certificate Radio III, or (c) City and Guilds Certificates Telecommunications Principles III (or higher) and Radio III (or higher), or (d) produce evidence of an equivalent standard of technical education. They must also have had not less than 8 years' experience in an appropriate telecommunications field, including manufacturing or maintenance or operation.

Inclusive London salary £480 (at age 23) to £670 (somewhat lower in Provinces). Starting pay up to £580 at age 28 or over on entry. Posts are unestablished but may have long-term possibilities.

Further particulars and application forms from Ministry of Transport and Civil Aviation, Establishments Staffing B1, Room 6057, Berkeley Square House, London, W.1, quoting ref. Staffing B1/TTO. Application forms must be returned by 20th July, 1954. 3706

BRUSH ELECTRICAL ENGINEERING COMPANY LTD.,

invite applications from suitably QUALIFIED ENGINEERS for various posts in their commercial organisation at Loughborough Works. Both SENIOR and JUNIOR ENGINEERS are required in each of the SWITCHGEAR, ROTATING MACHINES, TURBO-ALTERNATOR, and GENERAL ENGINEERING DIVISIONS, and the duties comprise essentially the preparation of tenders and handling of contracts.

Candidates should be trained Engineers with wide experience of the products concerned, whilst in the case of General Engineering knowledge of Diesel/Steam Power Station practice is necessary. The conditions of service include a non-contributory Staff Pension Scheme and the posts carry attractive commencing salaries with good prospects of advancement. Housing assistance will be considered in appropriate cases.

Applications, giving full details of training, experience, age, etc., should be addressed to the Chief Personnel Officer, Brush Electrical Engineering Co. Ltd., Loughborough. 3679

ELECTRICAL CONTRACTS ENGINEERS REQUIRED BY COOKE & FERGUSON LIMITED SWITCHGEAR SPECIALISTS MANCHESTER

VACANCIES must be filled for posts of Section Leader level on high-voltage contracts work for the B.E.A. and overseas customers. Applicants must have Higher National Certificate and be able to control a section of the drawing office.

Salary rates above association levels resulting from Staff Assessment Scheme for applicants with the satisfactory qualifications.

Reply stating experience and qualifications to Personnel Officer, South Street, Openshaw, Manchester, 11. 3630

ATOMIC ENERGY RESEARCH ESTABLISHMENT, HARWELL

OPPORTUNITIES exist on a wide variety of mechanical, electrical, electro-mechanical, electronic and chemical plant work, including checking duties on electronic and electro-mechanical work. Vacancies exist in the DRAUGHTSMAN, LEADING DRAUGHTSMAN and SENIOR DRAUGHTSMAN grades, with salary maxim £640, £742 and £910 respectively.

Further details (including information on starting pay) and application forms available on request from Establishment Officer, A.E.R.E., Harwell, Berkshire (Quote 2/103/98). 3781

ATOMIC ENERGY RESEARCH ESTABLISHMENT

Harwell, Berkshire

VACANCIES exist for technical staff engaged on calibration, installation, servicing and maintenance of electronic equipment used for nuclear radiation measurements and associated test equipment.

Applicants should have served a recognised engineering apprenticeship or hold equivalent technical qualifications and have had training and experience in electronics. They should be conversant with conventional electrical and electronic measuring apparatus. Possession of Ordinary or Higher National Certificate, or equivalent City & Guilds certificates, with a knowledge of pulse technique circuitry (e.g., radar) would be advantageous.

Five-day week of 44 hours (net).

Salary: Technical Grade II £635 (linked to age 30)—£742 per annum.
Technical Grade III £510 (linked to age 26)—£640 per annum.

Application forms and further information available on request from Establishment Officer, A.E.R.E., Harwell, Near Didcot, Berkshire (Quoting reference 2/103/103). 3781a

WARWICKSHIRE COUNTY COUNCIL

Architect's Department

APPLICATIONS are invited for the following appointment:—

ENGINEERING CLERK OF WORKS, with practical experience in electrical installation work for lighting, power and allied services for supervision of contracts in schools and similar buildings.

Candidates should have had experience as foreman on contracts of £10,000 value and over and at least 15 years' experience. Salary, £580 × £15-£625 per annum.

The appointment is on the established staff and will be subject to the provision of the Local Government Acts, 1937-53. The successful applicant will be required to pass a medical examination.

Applications are to be made on a form which can be obtained from G. R. Barnsley, F.R.I.B.A., County Architect, Shire Hall, Warwick. Forms to be completed and returned by July 9th, 1954.

L. EDGAR STEPHENS,
Clerk of the Council.

Shire Hall,
Warwick.
June, 1954. 3820

ADMIRALTY—ROYAL NAVAL SCIENTIFIC SERVICE

SENIOR SCIENTIFIC OFFICERS and SCIENTIFIC OFFICERS required in Experimental Establishments in London, Portsmouth, Weymouth and Gloucestershire areas and Scotland. The majority of posts are for Engineers and Physicists (particularly with Electronics).

Candidates must be British subjects with an appropriate first or second class honours degree or equivalent high professional attainments.

Salaries: S.S.O. (M) £975-£1,150; S.O. (M) £470-£855. London rates. Somewhat lower in Provinces. All appointments are unestablished (with F.S.S.U.), but with some opportunities to compete for established posts.

Application forms from M.L.N.S., Technical and Scientific Register (K), 26, King Street, London, S.W.1, quoting A.246/52/A. 3723

SOUTH WALES ELECTRICITY BOARD

JUNIOR ENGINEER (Protection) required, based at Fforestfach in the West Central Sub-Area.

Successful applicant will be required to assist the Protection Engineer in carrying out commissioning and maintenance tests on all classes of protective gear on the Board's distributive system and should have had a sound engineering training.

Salary, Class AX/CX, Grade 9 (£390/£556), of N.J.B. Schedule, commencing at £417 per annum.

Applications stating age, present position and salary, qualifications, experience and three referees, to be addressed to the Secretary, to arrive by 3rd July, 1954.

D. G. DODDS,
Secretary.

St. Mellons,
Cardiff. 3788

BRITISH ELECTRICITY AUTHORITY

Yorkshire Division

SECOND ASSISTANT ENGINEER (Electrical) required for Generation Construction Department, Rotherham.

Salary £834-£1,053 per annum, Grade 2, Class AX/DX, National Joint Board Agreement (Schedule C).

Applicants should have educational and engineering experience up to the standard required for Associate Membership of the Institution of Electrical Engineers, and should have had experience in the design and installation of turbo-alternators, switchgear, transformers and cables up to 33 kV, and other electrical equipment associated with a modern power station. Experience in the preparation of specifications and estimates would be an advantage.

Application forms, obtainable from Divisional Secretary (Establishments), British Electricity House, St. Mary's Road, Leeds, 7, to be returned within 14 days of the appearance of this advertisement.

G. A. VOWLES
Divisional Controller. 3783

W. T. HENLEY FELLOWSHIP

THE GOVERNORS OF QUEEN MARY COLLEGE invite applications for a W. T. Henley Fellowship. The Fellowship is tenable for two years and may be extended for a third. The successful applicant will be expected to do research work in Electrical Engineering and the College facilities are particularly good for research work in dielectrics, high-voltage engineering and arc-interruption phenomena.

The Fellowship should be particularly attractive to those who wish to obtain a Higher Degree or wish to re-enter the University with a view to an academic career. Candidates should possess a good University degree in Electrical Engineering or in Physics. They should preferably have had research or industrial experience.

Remuneration, £600 to £900 per annum, according to qualifications and experience.

Application forms, obtainable from The Registrar, Queen Mary College (University of London), Mile End Road, E.1, should be returned as soon as possible and in any case not later than July 19th. 3821

BOROUGH OF EDMONTON

Electrical Assistant, Borough Architect's Department

THE Council require a suitably qualified ELECTRICAL ASSISTANT to take charge of the electrical section of the Borough Architect's Department. Applicants must have had sound experience in practical installations, controlling labour, organising routine maintenance, supervising contracts, designing installations and estimating.

Grade APT. V/Va £620 by 2× £15 and 3 × £20 to £710 plus London weighting £10 to £30 according to age. 44-hour week.

Applications on forms from Town Clerk, Town Hall, Edmonton, must be delivered by 2nd July, 1954. 3780

NORTH WESTERN ELECTRICITY BOARD

Appointment of District Engineer, Kearsley District

DUTIES will include the control of the District Engineering and Drawing Office Staffs and responsibility for the construction, operation and maintenance of the District distribution systems (overhead and underground). Corporate Membership of the Institution of Electrical Engineers will be an advantage.

Salary scale £1,068/£1,115 p.a., Grade G.2. N.J.B. conditions.

Applications to Sub-Area Manager, No. 2 Sub-Area, North Western Electricity Board, National Buildings, St. Mary's Parsonage, Manchester, 3, by 30th June, 1954. 3756

ASSISTANT foreman required. To supervise the assembly and wiring of automatic control gear. Good salary and prospects. For successful applicants requiring housing accommodation, assistance may be given for skilled and key personnel. Pension scheme, 5-day week, canteen. Details of age, experience, qualifications and commencing salary to—Personnel Officer, Dewhurst & Partner Ltd., Inverness Road, Hounslow, Middlesex. 3576

AN attractive career is available to young men of good education and training with the personality required for success in selling rotating electrical machinery up to 1,000 h.p. Necessary qualifications are Ordinary National Certificate in Electrical Engineering and some practical experience in the manufacture, repair or installation of industrial motors and generators. Pension scheme and bonus on results. Applications, giving full details of age, education, training, experience and salary required, to—Higgs Motors Ltd., 109, Kingsway, London, W.C.2. 3592

APPLICATIONS are invited by the Electrical Research Association from graduates in physics, engineering, mathematics or physical chemistry, for fundamental and applied research in various applications of electricity. Starting salaries are from £475 to £600 p.a. for those with post-graduate qualifications or from £600 to £800 p.a. for those with higher qualifications. Appointments are eligible for superannuation under the F.S.S.U. Application should be made to the Director, E.R.A. Laboratory, 5, Wadsworth Road, Greenford, Middlesex. 3680

ARMATURE winder required. Progressive permanent post. Must be fully experienced and able to carry out without supervision rewinds, repairs, re-designs all types motors, fractional to 10 h.p., A.C. and D.C., also transformers, chokes, etc. Resident London.—Box 9978.

ASSISTANT chief engineer required by company engaged in the design and development of guided weapons. Candidates must be mechanical engineers with first-class qualifications and experience in electronics and light engineering. Knowledge and experience in servo-mechanisms essential since duties would include responsibility for missile control systems, electrical gyros, accelerometers, etc. Applicants should be 30-35 years of age and have sufficient personality and experience to administer and organise the development activity on these subjects. Write in detail, quoting reference G, to—Box AC.91032, Samson Clarks, 57/61, Mortimer Street, London, W.1. 123

ASSISTANT electrical engineer required for supervising and maintenance of generating power plants, switchgear, motors and lighting installations for factory, dwellings, offices and roads, etc., on large sugar estate in Portuguese East Africa. Applicants should have been apprenticed to and regularly trained with a reputable electrical engineering company, also have requisite technical knowledge, with certificates, at least to Higher National standard, to comply with Portuguese Government requirements. Basic salary £55 per month, plus allowances, representing, at present, an income of £880 per annum, with negligible income tax, also free furnished house, medical attention and pension scheme. Write in first instance, stating training, experience and qualifications, together with full personal particulars, to—Box 3759.

ASSISTANT required in electrical department of commercial company in Oldham. O.N.C. or H.N.C. standard in electrical engineering together with commercial experience. Age limit 25 to 40. Replies, stating age, experience and ability, to—Box 3792.

BOLIVIA. Canadian electrical utility operating in La Paz, Bolivia, requires services of an electrical distribution engineer. Salary 5,600 United States dollars per year. Three years' tour with paid leave. Single or married without children, aged 25-30. Particulars to —Box 3633.

BRITISH ENGINE BOILER AND ELECTRICAL INSURANCE Company Ltd., 24, Fennel Street, Manchester, 4. The company requires additional electrical plant inspectors. Permanent positions carrying progressive salary scale, £540 to £785, and non-contributory pension. Candidates age 26 to 30 years with apprenticeship in the manufacture or repair of electrical machinery and preferably with subsequent experience of industrial use of electrical machinery, and who have gained the Higher National Certificate in electrical engineering or are graduates of the Institution of Electrical Engineers, are invited to apply in own handwriting, stating age, qualifications and experience. 3793

CONSULTING engineers in London require draughtsman for preparation designs, drawings and specifications for lighting and power installations; minimum age 25; salary not less than £625 per annum. Apply with full particulars to—Box 3635.

BRUCE PEEBLES & Co. Ltd., Edinburgh, require an inside sales engineer for the preparation of tenders for flameproof motors and control gear. Applications stating age, experience and salary required to Mr. V. P. Mackay, Rotating Plant Department Manager, at the above address. 3634

CHIEF estimator for Birmingham pump manufacturer to take charge of home and export estimating and correspondence. Knowledge of A.C. motors and control gear, and also experience in handling overseas agencies essential. Pump experience desirable. Salary according to experience. Staff of advertiser are aware of this advertisement. All replies acknowledged. —Box 3760.

COMMISSIONING engineers required by a well-known firm of consulting engineers. Duties will involve the commissioning of new boilers, turbo-alternators and power station plant, and in some cases these plants are situated overseas. Candidates will have to be prepared to attend foreign sites for short periods to commission plant. Applicants must have had a number of years' experience in the operation of power plant, and experience with diesel engines would be an advantage. The salary offered will be in accordance with the applicant's experience and qualifications. Applications should be forwarded to—The Personnel Officer, Ewbank & Partners Ltd., 10/11, Grosvenor Place, London, S.W.1. 3761

CONTRACTS engineers required for handling of switchgear tenders and contracts. Applications should state age, experience, qualifications and salary required, and should be addressed to—The Personnel Manager, South Wales Switchgear Ltd., Blackwood, Mon. 3775

CONTROL gear draughtsmen required for diagram work by firm in North-East London. Apply, stating age and experience, to—Box 3712.

CROMPTON PARKINSON Ltd., Chelmsford, require person capable of dealing with enquiries and orders for automatic and manual starters and control gear, including automatic voltage regulators for use with a wide range of A.C. and D.C. motors and generators. Superannuation scheme, extensive sports, social and welfare facilities. Write, stating age, present salary, etc., to the Personnel Officer. 3683

CROMPTON PARKINSON Limited have a vacancy for a man about 25 years old in the export division in the department which deals mainly with cables and lighting fittings. Some commercial experience in this field is a necessary qualification. The position is permanent and progressive. Excellent conditions of work, canteen, superannuation scheme. Applications in detail, including salary required, should be addressed to—MD/P(EX), Messrs. Crompton Parkinson Limited, Crompton House, Aldwych, London, W.C.2. 3795

CROMPTON PARKINSON Ltd. have vacancies for both senior and junior draughtsmen at their Chelmsford works. Preference will be given to applicants having contract, development or diagram experience on switchgear up to 11 kV, but adaptable men having good electrical and mechanical experience will be considered. Conditions of employment are ideal and prospects are good. Apply giving fullest particulars to—The Personnel Officer, Crompton Parkinson Ltd., Chelmsford Works, Essex. 3535

CROMPTON PARKINSON Limited invite applications for the post of assistant in their export department in London. Duties include agency control and study of overseas market conditions in connection with the company's products. Sound knowledge of Spanish essential and a working knowledge of Portuguese and electrical engineering matters desirable. Excellent conditions of work, canteen, superannuation scheme. Applications in detail, including salary required, should be addressed to—MD/P(GS), Messrs. Crompton Parkinson Limited, Crompton House, Aldwych, London, W.C.2. 3794

DEPT. manager (asst.) reqrd. by electrical wholesalers. Previous experience and knowledge of goods essential. Progressive position.—London Electrical Co., 92, Blackfriars Road, London, S.E.1. 3516

DESIGN draughtsman required for M.V. and E.H.V. switchgear; H.N.C. or equivalent. Salary commensurate with qualifications. Pension scheme. Apply—Chief Engineer, J. G. Statter & Co. Ltd., Amersham Common, Bucks, marked Confidential. 3796

DESIGN draughtsman. A vacancy exists in our design drawing office for a first-class designer draughtsman for interesting work associated with the development of automobile electrical equipment. He should be at least of H.N.C. standard and experience in the design of light electrical equipment for large quantity production would be an advantage. The post provides excellent scope for initiative and advancement. Reply stating qualifications, experience and age, to—Personnel Manager, Joseph Lucas Ltd., Great King Street, Birmingham, quoting reference PM/D/93. 143

DESIGN engineer. Nelson Research Laboratories, English Electric Co. Ltd., for a vacancy in either London or Stafford for a design engineer to work on prototype electromechanical devices and instruments. Applicants should preferably have had several years' experience in this field, but consideration will be given to men with suitable drawing office experience. Reply to Dept. C.P.S., 336/7, Strand, London, W.C.2, quoting ref. 1339. 3713

DESIGNER-draughtsman, preferably with experience on electro-mechanical instruments and components. H.N.C. (Mech.) standard with workshop training desirable. Good prospects and conditions with pension scheme. Location S.E. London. Full particulars and salary required to—Box 3748.

DRAUGHTSMAN for electrical installation layout. Junior would have opportunity to study. Write full details to—The Phœnix Electrical Co. (London) Ltd., 16-18, Marshalsea Road, London, S.E.1. 3714

DRAUGHTSMAN required as assistant to design engineer. This is a unique opportunity for a keen young man with experience in the design and detail of electro-mechanical devices. Applicants must be willing to undertake all duties connected with a drawing office and should be of at least O.N.C. standard. Five-day week, canteen facilities, paid holiday this year. Salary £500/£650 per annum, depending upon experience. Company situated 20 miles north of London. Our staff have been advised of this appointment. Write giving full details to—Box 3574.

DRAUGHTSMAN required at the Rugby works of the British Thomson-Houston Co. Ltd., for layout and detailing of A.C. and D.C. motors and generators. Experience not essential. Progressive position for man of initiative. Apply to—Chief Draughtsman, Motor Drawing Office, The British Thomson-Houston Co. Ltd., Rugby. 3739

DRAUGHTSMAN required for electrical elements and thermal devices manufacturers. Knowledge of presswork and press tool design an advantage. A distinct opportunity. House available if required. Five-day week. Pension scheme, canteen, etc. State briefly age, experience, technical training, salary, whether married with family, to—Works Manager, Best Products Ltd., Felixstowe, Suffolk. 3767

DRAUGHTSMAN required for switchgear development work. Good salary offered to suitable applicant. Pension scheme available. Reply stating age, salary, full details of technical qualifications and experience to—Erskine, Heap & Co. Ltd., Lancashire Switchgear Works, Salford, Manchester, 7. 3654

DRAUGHTSMEN. Previous experience in motor control equipment circuit work helpful but not essential if applicants are up to O.N.C. standard. Good salary and prospects. For successful applicants requiring housing accommodation, assistance may be given for skilled and key personnel. Pension scheme; 5-day week; canteen. Details of age, experience, qualifications and commencing salary to—Personnel Officer, Dewhurst & Partner Ltd., Inverness Road, Hounslow, Middlesex. 3449

EAST Africa. Assistant engineers with experience in hydro-electric station operation and maintenance. Salary and allowances £900-£1,000 p.a., according to experience. Write, stating age, to—Box E.R.848, c/o 191, Gresham House, London, E.C.2. 3684

ELECTRICAL draughtsman, 25-30, preferably familiar with heavy industrial plant, practice and layout. Knowledge of distribution systems up to 3,300 volts. A.C. and D.C. motor control schemes and preparation of schematic diagrams. Salary depending on age and experience. Superannuation scheme. Applications to be received by 19th July addressed to—Electrical Engineer, Guest Keen Iron & Steel Works, Cardiff. 3617

ELECTRICAL contractors, Inner London, require experienced estimating and supervising engineer. Pension scheme. Write stating age, experience and salary required in strict confidence to—Box 9957.

ELECTRICAL designers and draughtsmen required permanently. Experience in lighting and power installations for schools, hospitals and other large institutions. Five-day week. Excellent prospects. Interview expenses refunded. Confidential applications to—E. G. Phillips Son & Norfolk, Consulting Engineers, Arskus House, Annesley Grove, Nottingham. 3796

ELECTRICAL draughtsman required for Sheffield steelworks. Age between 21 and 24. Must have completed National Service. The vacancy is suitable for a young man who wishes to further his training. Write—Box 2NG.1672, A.K. Advg., 212a, Shaftesbury Ave., London, W.C.2. 3725

ELECTRICAL engineer, age 30-40, preferably chartered, required for leading position in design office of London company manufacturing automatic precision machinery. Previous drawing office and industrial experience of control gear and mechanisms essential. Responsible progressive staff appointment (contributory pension scheme).—Box 3726.

ELECTRICAL engineer, preferably under 30 years, university graduate or equivalent, for development work on high-voltage cables and accessories. Experience an advantage but not essential. Apply—Research Manager, W. T. Henley's Telegraph Works Co., Gravesend, Kent. 3715

ELECTRICAL engineer. Simon-Carves Ltd. have a vacancy in their Precipitator Division for an electrical engineer with at least five years' experience of contract and project work. H.N.C. is an essential qualification, while A.M.I.E.E. is desirable. The successful candidate will deal with technical correspondence, schemes, testing and fault location on site, and the supervision of electrical installation in connection with projects and contracts for electro-precipitators. Initial salary will depend upon age, experience and qualifications. Working conditions and scope are excellent and a pension scheme is in operation. Apply in writing, quoting ref. MN37, to—Staff & Training Division, Simon-Carves Ltd., Cheadle Heath, Stockport. 3762

ELECTRICAL machine designer. A. Reyrolle & Company Ltd. have a vacancy in their rotary equipment department for an engineer to assist in the design and development of A.C. generators and motors, including commutator motors. Applicants should have had training and experience in this class of work and should possess at least the Higher National Certificate in Electrical Engineering. Preference will be given to Corporate Members of the Institution of Electrical Engineers. Please apply with full particulars to—The Chief Engineer, A. Reyrolle & Co. Ltd., Hebburn, Co. Durham. 3742

ELECTRICAL/mechanical engineer, technical or experience generating plant, cranes, etc. Write briefly, stating age, education, qualifications, experience, salary required, to—Box 3797.

ELECTRICAL research assistant. A large organisation in the North West wishes to appoint a young man to evaluate the electrical properties of new insulation products. Possession of Higher National Certificate in electrical engineering is desirable.—Box 3686.

ELECTRICAL sales engineer required for the Manchester area by a well-known engineering company for the purchase and sale of electrical machinery. Applicants should please submit details of previous career in chronological order to—Box 3798.

ELECTRICAL wholesaler requires manager for Scottish branch due to promotion of existing manager. Salary, commission, expenses, bonus, superannuation. Please forward complete details of career to date to—G. M., Box 3746.

ELECTRICAL wholesalers (E.W.F.) invite applications from experienced representatives who have an established turnover in the area and who are qualified to accept a branch manager's position in Bedfordshire. Brief particulars in strict confidence.—Box 3727.

ELECTRICAL wholesalers (E.W.F.) require experienced representative having established turnover in London and Greater London. Existing good turnover would be given to selected applicant. Brief particulars in strict confidence.—Box 3728.

ELECTRICAL fitters required as permanent outworkers for erection of all types of power station and industrial installations, comprising switchgear, transformers, rectifiers, large electrical machines and turbo-alternators. Apply — Construction Department, B.T.H., Rugby. 3740

ELECTRICIANS required, having thorough knowledge of trade, including M.I.C.C. cables. Five-day week and sick club operated. Only efficient men, able to work under minimum supervision, need apply. — Maintenance Contracts Ltd., Wenlock Road, London, N.1. 3716

ELECTRO-mechanical draughtsmen required. Applicants should be up to O.N.C. standard. Good salary and prospects. For successful applicants requiring housing accommodation, assistance may be given for skilled and key personnel. Pension scheme; 5-day week; canteen. Details age, experience, qualifications and commencing salary to—Personnel Officer, Dewhurst & Partner Ltd., Inverness Road, Hounslow, Middlesex. 3450

ELECTRONIC engineer is required by the British Tabulating Machine Company Ltd. (Hollerith punched cards) to undertake servicing duties on electronic equipment to be marketed by the company with their subsidiary company in India. The successful applicant would receive a thorough course of training before leaving the U.K. and then to transfer to India for a tour of three years. Generous tour allowance and family allowance will be paid while serving in India, with adequate overseas leave and full pay on completing the tour. It is anticipated that there would be no difficulty in absorbing the successful applicant in the home field when the India tour has been completed. Applicants should have experience in the electronic engineering field and hold a National Certificate Electrical or Telecommunications Part I, II and III or Radio I and II. Applications will also be welcomed from naval-trained radio mechanics or electrical artificers who have specialised in electronic equipment and who have experience in the servicing of radar and associated equipment. Applicants must be physically fit for overseas service and the age limit will be 30 to 35. The home basic salary will be not less than £550 per annum, and accommodation will be paid and provided while training is undertaken at the company's school. The appointment is one enjoying staff conditions with a sick pay scheme and contributory pension scheme. Write in strict confidence, stating age, qualifications and experience, to — Staff Section, Field Engineering, Sales Division, The British Tabulating Machine Company Ltd., 17, Park Lane, London, W.1. 3717

ENGINEER or practical physicist required to supervise a laboratory section concerned with routine performance testing of electrical components to Government and industrial specifications.—Dubilier Condenser Co. (1925) Ltd., Victoria Road, N. Acton, London, W.3. 3763

ESTIMATOR for indoor sales staff required by Crompton Parkinson Ltd., Chelmsford. Applicants must have initiative and be experienced in dealing with enquiries relating to A.C. and D.C. rotating electrical machinery up to 1,500 h.p./kW. Superannuation scheme, and extensive social, sports and welfare facilities. Write, giving fullest particulars, to the Personnel Officer. 3682

EXPERIENCED transformer designer, conversant with high-voltage power transformer practice, required. The vacancy offers great opportunities to a person with initiative and drive. Good salary and pension scheme. Accommodation available. Apply giving full particulars of past experience to—Box 3597.

FITTER required for electrical and mechanical maintenance of works plant; 44-hour, five-day week; present rate 4s. per hour.—Richmond Sewerage Board, West Hall Road, New Gardens, Surrey. 3711

HIGHLY skilled electrician required for small contractors. Prepared to reside in East Coast town. Excellent prospects for advancement.—Box 3619.

IMPERIAL CHEMICAL INDUSTRIES Limited, Metals Division, requires a fully qualified young electrical and mechanical engineer, capable of designing large scale industrial power plant extensions. A good engineering degree, coupled with a keen interest in thermodynamic problems will be an advantage. Application forms may be obtained from Assistant Staff Manager, I.C.I. Metals Division, Kynoch Works, Witton, Birmingham, 6. 3800

GOOD electrician required, must be used to power work.—P. H. Boys & Co. Ltd., 187, Goswell Road, London, E.C.1. 3799

GRADUATES in electrical engineering or physics are required for impulse voltage and impulse current research in a high-voltage laboratory. There are opportunities for fundamental research on spark gaps and for applied research on insulation and on surge diverters. Applicants should be able to carry out investigations largely on their own initiative. Previous works training and laboratory experience (not necessarily on impulse work) are desirable. The appointments are permanent and pensionable; starting salary will be in accordance with qualifications. Applicants must have completed their National Service obligations. Write giving full particulars, including age, sex, nationality, education and experience, to—Personnel Manager, Metropolitan-Vickers Electrical Co. Ltd., Trafford Park, Manchester, 17. 3656

IMPERIAL CHEMICAL INDUSTRIES Ltd., General Chemicals Division, requires an electrical/mechanical engineer or physicist for general process instrument work in the chemical industry in the North-West. Candidates should have an honours degree and some workshop experience in industry or in the armed services. Successful candidates will be appointed to the permanent staff with membership of the pension fund. Good prospects in a rapidly developing field exist for properly qualified individuals. Apply giving full particulars to — The Staff Manager, Imperial Chemical Industries Ltd., General Chemicals Division, Cunard Building, Liverpool, 3. 3199

IMPERIAL CHEMICAL INDUSTRIES Ltd., Metals Division, has a vacancy at its Witton works for a senior design draughtsman (electrical) with experience of layout of industrial power distribution, automatic control gear and substation design. Application forms may be obtained from—Assistant Staff Manager, I.C.I. Metals Division, Kynoch Works, Witton, Birmingham, 6. 3719

JOHNSON & PHILLIPS Limited have vacancies in their cable estimating department; preference will be given to men experienced in preparation of estimates of cost of rubber-insulated cables and flexibles, also thermoplastic cables. Applications giving age, experience and salary expected should be addressed to—Employment Manager, Johnson & Phillips Ltd., Victoria Way, Charlton, London, S.E.7. 3542

JOHNSON & PHILLIPS require an estimator and technical correspondent in their transformer department. Preference will be given to a man experienced in the preparation of tenders for the home and export market. Applications giving particulars of training and experience, together with age and salary required, to—Employment Manager, Johnson & Phillips Limited, Charlton, London, S.E.7. 3623

JUNIOR draughtsmen required. Excellent opportunity for suitable men with at least Ordinary National Certificate to broaden experience and develop progressive career with prominent, well-established organisation. Near city centre and all amenities. Easy reach London. Well served transport routes. Holidays fixed can be held. Apply—Marconi Instruments Ltd., Longacres, Hatfield Rd., St. Albans. 3636

JUNIOR transformer designer required for interesting work in the design of power transformers, regulators and associated control gear. Previous design experience desirable. Excellent prospects for the right candidate. Apply—Brentford Transformers Ltd., Kidbrooke Park Road, London, S.E.3. 3598

MACLEANS Ltd. require a works engineer for a factory in the London area. Applicant must be a qualified mechanical or electrical engineer, preferably degree or Higher National Certificate, with experience of plant installation and operation and factory engineering allied to electronic control of processes, and should be capable of training staff in the installation and maintenance of electronic equipment. Post offers excellent opportunity to man with progressive outlook. Age 30 to 40. Pension and profit participation schemes. Salary dependent upon experience and qualifications. Write, giving fullest details of age, qualifications and experience and salary required, to—Personnel Manager, Macleans Limited, Great West Road, Brentford. 3801

MAINTENANCE electrician large factory Greenford area, experience with D.C. motors and control gear a recommendation; permanent situation. Write fully—Box 3657.

MANAGER for electrical repair and maintenance organisation in N.E. Lancashire. Applicant must have repair shop experience and be capable of handling maintenance contract work.—Box 3521.

MECHANICAL draughtsman wanted for factory in West Midlands. Permanent and pensionable post, attractive working conditions. Maximum salary approximately £730 p.a. Experience of design of malleable castings an advantage. Apply giving particulars of age, qualifications and experience to—Box 3718.

OUTSIDE sales engineer required by company manufacturing electrical rotating machinery, 1 to 100 h.p. The successful applicant will be based at Loughborough, Leics., and will have to cover the East Midlands area. Possession of Ordinary National Certificate in Electrical Engineering is a necessary qualification and previous experience of this range of products is essential. Salary dependent upon qualifications and experience. Non-contributory superannuation scheme.—Box 3620.

OVERHEAD line engineer required by consulting engineers for supervision of work in North Scotland and Outer Islands. Applicants should have had experience in the design and construction of overhead lines up to 33 kV. Salary according to experience. Applications, together with details of education, training and experience, should be sent to—Messrs. Kennedy & Donkin, 3, North Charlotte Street, Edinburgh, 2. 3729

PIRELLI-GENERAL CABLE WORKS Ltd. have a vacancy for a capable general foreman with sound experience in construction, supervision of labour and all-round organising ability for erection of steel tower transmission lines. Apply in writing, giving details of experience, etc., and salary expected, to—Overhead Lines Dept., Eastleigh, Hants. 3691

PIRELLI-GENERAL CABLE WORKS Ltd. have vacancies for engineer and assistant engineers having experience in construction of steel tower transmission lines. Applicants must be willing to travel. Apply in writing, giving full particulars of experience, etc., and salary expected, to — Overhead Lines Department, Eastleigh, Hants. 3690

PLANT engineer (preferably university graduate), to be responsible for the running and maintenance of all services, including electricity generation (turbines and alternators), central heating (oil fired), ventilation, etc., also production machinery, required for an interesting factory now being erected on outskirts of London. The successful applicant would be eligible for a permanent pensionable post at a starting salary of not less than £1,200 depending on age, qualifications and experience. Upper age limit 45. Write stating age and giving details of education, qualifications and experience to—Box P.908, c/o Streets, 110, Old Broad Street, London, E.C.2. 3730

PRODUCTION engineering assistants with experience of batch production assembly of light and medium electro-mechanical apparatus required. H.N.C. or equivalent desirable. Contributory pension scheme. Salary commensurate with qualifications and experience. Apply to — Personnel Superintendent, Westinghouse Brake & Signal Co. Ltd., Chippenham, Wilts. 3600

PRODUCTION supervisor. A vacancy offering scope for progress is available for suitable applicant having experience in production of tape and wire-wound electrical elements and a good knowledge of electrical domestic appliances. Commencing salary £850. Write giving full details of past experience, age, etc., to—Box 3744.

QUALIFIED engineer, wide experience, required as assistant to chief engineer of company producing extensive range of engine-driven equipment. Capacity 5-250 h.p. Knowledge of design and development in connection with generator, compressor and pumping applications. Commencing salary and bonus approximating to £1,000 per annum, compulsory pension scheme. Excellent prospects. West Middlesex.—Box 3802.

REPRESENTATIVE to cover S.E. Scotland Electricity Board and N. of Scotland Hydro-Electric Board areas. Applicants should be resident on the territory, have good contacts with architects, wholesalers and contractors, and possess their own car. This is an interesting and worthwhile post for a man with right background. Write in confidence to—The Sales Manager, M.K. Electric Limited, Wakefield Street, London, N.18. 3427

QUALIFIED mechanical draughtsman required N.W. London district. Knowledge of electricity an advantage.—Box 3640.

SALES correspondent (technical) required. This position offers good salary and status with opportunity for advancement at home or overseas. Please reply with full details of experience, age and salary required to—Secretary, Chamberlain & Hookham Ltd., New Bartholomew Street, Birmingham, 5. 3731

SENIOR and ordinary electrical draughtsmen required, preferably with experience in switch fuse design and detailing, for interesting work at Chester. Subsistence expense paid to men coming to the area. Excellent conditions, pension scheme and good salary. Holidays arranged this year can be taken. Apply with full particulars to—Box 3622.

SENIOR electrical draughtsman required for research and development work at Havering, Romford. Sound experience in power wiring and layouts essential. Application in writing, giving full personal details to—Ilford Limited, Romford, Essex. 3481

SENIOR electrical foreman required to assist with the production of A.C. and D.C. electrical machinery. In addition to the necessary technical knowledge applicants must have wide experience in the manufacture of A.C. and D.C. motors, generators and alternators. Permanent position with full staff status and pension rights. Applications, which will be treated in the strictest confidence, should state full details of previous experience, age and present salary to—Works Manager, W. H. Allen, Sons & Co. Ltd., Queens Engineering Works, Bedford. 3641

SENIOR laboratory technician (radio) required at South-East London Technical College, Lewisham Way, London, S.E.4; 44-hour week. Salary scale £393 15s. to £493 15s., and with certain qualifications to £568 15s. Further partics. and appl. forms (returnable within 14 days) from Secretary. (782) 3732

SLOAN ELECTRICAL Co. Ltd. invite applications from experienced representatives for appointments to branch shortly opening in Birmingham. Salary, commission, expenses, pension scheme. Applications in writing to—W. Webster, Sloan Electrical Co. Ltd., 169, Hockley Street, Birmingham, 19. 3745

SMART & BROWN require a young energetic representative for the Lancashire areas and applications should be made to the Sales Supervisor at 11, Blackfriars Street, Manchester, 3. A car is essential. Basic salary plus commission and expenses; pension scheme. 3720

STORES and clerical assts. reqrd. Knowledge electrical trade. Progressive positions.—London Electrical Co., 92, Blackfriars Road, London, S.E.1. 3517

TECHNICAL assistant for interesting work in S.E. London on laboratory electrical and electronic instruments. G.C.E. advanced science or H.N.C. standard. Applicants with practical experience and National Service completed, or nearly so, please write giving full particulars and salary required to—Box 3747.

TECHNICAL sales engineer required by electrical manufacturers in the Midlands to prepare estimates and deal with contracts. University degree or Graduate I.E.E. preferred. Excellent opportunity for engineer with sales initiative prepared to settle down and make position a career. Work will involve periodic visits to special customers. Commencing salary £600/£800 per annum according to experience. Write stating age, qualifications and experience to—Box 3665.

TECHNICAL sales representative required by old-established English company in Uganda representing many important U.K. manufacturers. Age 30/35, preferably single, with sound sales and estimating experience covering electrical and applied plant as applied to industrial projects. Total emoluments £900/£950 p.a., free accommodation, paid home leave and passages for each 2-year contract, mutual provident fund, free medical, low income tax. Fullest particulars in confidence to—Box 3764.

THE advertisers, an old-established light electrical engineering firm, N.W. area, have immediate vacancies for draughtsmen (section leaders, seniors and juniors) who have experience in (a) chassis and rack design or (b) small electro-mechanical devices. All these posts are permanent and offer good prospects and attractive remuneration to those selected for appointment. Write, stating age, education, qualifications and experience, in confidence, to—Box 3721.

TESTER required for automatic control gear. Good salary and prospects. For successful applicants requiring housing accommodation assistance may be given for skilled and key personnel. Pension scheme; 5-day week; canteen. Details of age, experience, qualifications and commencing salary to—Personnel Officer, Dewhurst & Partner Ltd., Inverness Road, Hounslow, Middlesex. 3575

THE DISTILLERS Company Limited require for their Engineering Division, London office, senior and junior electrical draughtsmen for power and lighting layouts, with a knowledge of flameproof installation and equipment for industrial and chemical plants. Technical qualifications required are H.N.C. for senior and O.N.C. for junior draughtsmen. Replies giving full details of experience, qualifications, age and salary required should be addressed to—The Appointments Secretary, The Distillers Company Ltd., Engineering Division, Southern Office, Devonshire House, Mayfair Place, Piccadilly, London, W.1. 3765

THE EXPRESS LIFT Co. Ltd. wish to engage electrical draughtsmen with experience in design of circuits and equipment. Applicants should be over 23 years of age and preferably have had experience in the lift industry. Apply in writing to—Personnel Manager, Abbey Works, Northampton. 3749

THE GENERAL ELECTRIC Co. Ltd. has vacancies at the head office of their sales organisation for men who are interested and have had experience in commercial cooking and catering engineering. Applicants should be in the age group 25/30 years and possess the Ordinary National Certificate, preferably H.N.C., in Electrical Engineering, and be familiar with equipment used in the forementioned. Apply in writing, quoting ref. I.H., to—The Staff Manager, Magnet House, Kingsway, London, W.C.2. 3804

THE GENERAL ELECTRIC Co. Ltd. have vacancies on the staff of their sales organisation in London for young men of Ordinary National Certificate standard in Electrical Engineering. Excellent opportunities for promotion exist for those interested in sales of most types of electrical equipment and in work on the drawing board. Applicants, having drive and initiative, should have had a sound general education and preferably previous experience in a sales organisation. Apply in writing, quoting reference "Gen," to—The Staff Manager, Magnet House, Kingsway, London, W.C.2. 3803

THE RIO DE JANEIRO TRAMWAY, LIGHT & POWER Co. Ltd., a British company in Brazil, invite applications from suitably qualified men for a post in Rio de Janeiro as technical assistant, meter division. Candidates should be between 25 and 30 years of age, and should have a university degree or Higher National Certificate in Electrical Engineering, together with one to five years' experience in the meter department of a large utility or manufacturer. Salary will be in accordance with qualifications and experience, taking into consideration local cost of living; three years' agreement, subject to renewal, with first-class passage both ways; four months' leave on full pay after three years' service. Written applications, which will be treated in confidence, should be made to Mr. W. P. Kellett, Joint Manager, Canadian-Brazilian Services Limited, 148, Leadenhall St., London, E.C.3. Applications should be received by 31st July, 1954. 3685

TRANSFORMER test engineer. Young man required for a section of the test room dealing with a variety of unusual transformers. Preference will be given to applicants qualified by holding the O.N.C. in electrical engineering, completion of an apprenticeship with an electrical manufacturer, and having test experience on any types of transformers. Desirable additional experience would be testing precision instrument transformers, extra H.V. small transformers, transformers used by H.M. Services, and electrical instrument calibration. The salary would be determined by proof of experience and capabilities. Own staff have been informed.—Box 3603.

W. T. GLOVER & Co. Ltd., Trafford Park, Manchester, 17, require junior electrical engineer for the electrical testing section of development laboratory. The work involves electrical measurements appropriate to the light current field. Some knowledge of measurements at audio and radio frequencies advantageous. Salary commensurate with qualifications and experience. Apply to Secretary. 3734

THE GENERAL ELECTRIC Company Ltd. will be pleased to receive applications from young men in the age group 25/30 years who are interested in the commercial application of electric heat to industry. Vacancies exist in the head office of the sales organisation for those who have had experience in this type of work and have a minimum technical standard of Ordinary National Certificate. There are excellent prospects for promotion. Apply in writing, quoting reference P.H., to—The Staff Manager, Magnet House, Kingsway, London, W.C.2. 3766

WANTED, first-class electricians with contracting experience preferably. Good opportunity and permanency for suitable men. Good prospects. Apply—Lee, Beesley & Co. Ltd., 6, Warwick Row, Coventry, or Lee, Beesley & Co. Ltd., 41, Snow Hill, Birmingham, 4. 3733

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Dissatisfaction having so often been expressed that unsuccessful applicants are left in ignorance of the fact that the position applied for has been filled, may we suggest that Advertisers notify us to that effect when they have arrived at a decision? We will then insert a notice free of charge under this heading.

BERMUDA Electric Light Co. Ltd.—Applicants are informed that both posts previously advertised have been filled.

MACKNESS & Shipley—Assistant distribution engineer (San Salvador). All applicants are thanked.

M.K. Electric Ltd.—Representative for South Eastern Counties. All applicants are thanked.

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A GOOD all-round electrician. Technical education. Age 33 years. Car owner. Position with prospects.—120, Abbeville Road, London, S.W.4 (MACaulay 1645). 9976

A.M.I.E.E., age 37, seeks employment with an industrial organisation overseas where ability, initiative and experience in construction and operation of power stations and distribution schemes are required.—Box 9955.

ELECTRICAL engineer, 35, seeks responsible position. Designing, specifying industrial installations, switchgear, substations, lighting. Sales, overseas experience. Minimum salary £850, South/South-West preferred.—Box 9961.

ELECTRICIAN; prefer to travel. Seven yrs. last employer.—Box 9971.

MAINTENANCE engineer (Yugoslav), experience diesel and steam generating plant, workshop, etc. Sober. Capable of taking charge home or abroad.—Mancic, c/o Linker, 9, Elmstead Gardens, Worcester Park, Surrey. 3299

M.I.E.E. (39), consulting experience in design, estimating, supervision of industrial and commercial electrification, seeks appointment, preferably S.W. or S. London. Minimum salary £1,000 per annum.—Box 9977.

QUALIFIED elect./mech. engineer. Exp. management, technical, production, design on motors, etc., light engineering, control gear, gearing, foundry. Pres. sit. Essex/London.—Box 9975.

WANTED, progressive post by representative, age 27. Area covering Yorkshire, W. Riding, preferred.—Box 9963.

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ELLISON oil-immersed Circuit Breakers, 420 volts, 200 amps., floor mounting panel with duplicate busbars.

REYROLLE oil-immersed Circuit Breakers, 420 volts, 1,000 amps. Fitted with relay protection.

333-kVA Transformer by JOHNSON & PHILLIPS, 400/6,600 volts, 3-phase.

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TWO 1,500-kW BRUSH Ljungstrom Turbo-Alternator Sets; working pressure 185 lb. per square inch; 6,600 volts, 3-phase, 50 cycles; 3,000 r.p.m.; complete with Surface Condenser and all ancillary equipment.

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All motors are in excellent order.

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MODERN, 400/3/50, fully reconditioned. All sizes, ¼ to 75 h.p. Offered at one half the makers' price. Control gear available. List or quotation by return.

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BABCOCK & Wilcox water tube boiler will cut down your fuel costs; we can supply from stock. Two 50,000 lb. evap., 200 lb. w.p.; 3,000 lb. evap., 400 lb. w.p. Spencer-Bonecourt boiler; also marine, Cornish vertical, etc. We install complete, including brickwork.—Burford, Taylor & Co. Ltd., Boiler Specialists, Commercial Street, Middlesbrough (Tel. Middlesbrough 2622). 36

BARGAIN in electric motors can always be obtained from A. Cooksley & Co. Ltd., 31-35, Tabernacle Street, London, E.C.2. Tel. Monarch 3357. Stocks at present comprise new squirrel cage motors, 1-25 h.p., also new and secondhand slipring motors, with starters, from ½ b.h.p. to 30 b.h.p. 50

HIGH-vacuum impregnation unit or single or batch coil impregnation service to BIC. specification 214 or individual requirements.—Blickvac, 505, Lordship Lane, London, S.E.22 Tel. Forest Hill 7089). 44

A.C. and D.C. house service-meters, all sizes, quarterly and prepayment, reconditioned, guaranteed one yr. Repairs and recalibrations. —The Victa Electrical Co., 47, Battersea High Street, S.W.11 (Tel. Battersea 0780). 138

A.C. and D.C. motors, all sizes, large stocks, fully guaranteed. — Milo Engineering Works, Milo Road, East Dulwich, S.E.22 (Forest Hill 2278-9). 102

A.C. and D.C. motors, generators, from stock.—Service Electric Co. Ltd., Honeypot Lane, Stanmore, Middx. (Edgware 5566/9). 91

A.C./D.C. meters.—Electric Meter Co., Dept. ER46, Castle Circus Hse., Torquay. 9948

ALTERNATOR control panel cubicles, 1,000 kW, 500 kW, 250 kW, 150 kW, 3-phase, 440 volts.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 31

ALTERNATORS for sale from ½ kVA to 500 kVA, all voltages, single and three-phase, complete with exciters, automatic voltage regulators and switchboards. Low prices, guaranteed for one year.—Fyfe, Wilson & Co. Ltd., Bishop's Stortford. 3811

ALTERNATORS, 2 to 30 kW, 1 and 3-ph., and D.C. generators, 300 w. to 24 kW. Lists.—Powerco Ltd., Wandsworth Town Station, York Rd., London, S.W.18 (Vandyke 5234). 151

ALTERNATORS, 3-phase, all sizes in stock from 7 kVA up to 330 kVA.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1 (CLErkenwell 5512). 33

CERAMIC cable cleats, 3⅜" (2 grooves). Large stock to clear. Contract or export.—Box 3768.

CIRCUIT breakers, various sizes in stock, A.C. and D.C., 200 amperes up to 2,000 amperes. Also dynamo and alternator switchboards. — Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 87

CIRCUIT breakers, 300 amps., 3-phase, 50 cycles, Crompton Parkinson clad type, floor mounting, 25 MVA rupturing capacity. Number available. — Britannia Manufacturing Co. Ltd., Britannia Walk, London, N.1 (Tel. Clerkenwell 5512). 21

CONVERTERS, 110 v. and 220 v. D.C. to 230/1/50, 0.3 to 6 kVA, from £15 up.—Powerco Ltd., Wandsworth Town Station, York Road, London, S.W.18 (Tel. Vandyke 5234). 154

CRANE motors. Direct current, series wound or compound wound, all voltages. We have large stocks. — Britannia Manufacturing Co. Ltd., 22/26 Britannia Walk, London N.1. 24

CURRENT transformers, ring type, 100/300 amps. Delivery ex stock.—Hurst Electrical Industries Ltd., 75a, Well Street, London, E.9 (Phone, AMHerst 4166). 79

D.C. motors and starters for 220 volts. Several for sale. Good serviceable secondhand equipment. Not merchants. Address enquiries for specific requirements to—Box 3743

DIESEL generating set, 7.5 kVA, 240 volts, single-phase, 50 cycles. Seen Hertfordshire.—Tel. Bartlett, Dane End 26. 9973

DIESEL generating sets, English manufacture, direct current, all voltages, all sizes to 500 kW.—Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, London, N.1. 17

DIESEL generating sets, English manufacture, 3-phase, all sizes to 500 kW.—Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, London, N.1. 16

ELECTRIC motors, dynamos, alternators and motor generator sets of all sizes. We hold one of the largest stocks in England. New and reconditioned, with 12 months' guarantee.—Britannia Manufacturing Co. Ltd., Britannia Walk, London, N.1 (Clerkenwell 5512, 3 lines); also Works and Stores, Chobham, Surrey. 20

ELECTRIC motors, generators, control gear, transformers, A.C. and D.C., new and reconditioned; all covered with our usual 12 months' guarantee; large stocks available.—Electropower Co. Ltd., Kingsbury Wks., Kingsbury Rd., London, N.W.9 (Colindale 4621-2). 42

ELECTRIC motors, generators, motor generator sets, transformers, switchgear, etc., large comprehensive stock, overhauled and guaranteed. Copy of our Register, "Electrical Surplus," containing thousands of items of electrical plant, sent on request.—R. F. Winder Ltd., Belgrave Electrical Works, Leeds, 2. 54

ELECTRICIANS. Send for details Shaftesbury lightweight "Bantam" ladders. Top sections fitted with patent moulded rubber blocks, eliminate possibility of scratching or marking walls, fascias, and other painted or highly polished surfaces. Also available for immediate delivery, steps, platform steps, trestles, telescopic trestles, pole and builders-type ladders, and all sizes of two and three-section extension ladders.—Shaftesbury Ladders Ltd. (E. R.), 453, Katherine Road, London, E.7 (Phone: Grangewood 3363/4). 23

D.C. meters.—The Electric Meter Co., Dept. ER46, Castle Circus Hse., Torquay. 9949

FLUORESCENT ballasts, wide range, 20 w., 30 w., 40 w., 80 w. Normal and high power factor. Built for long and dependable life, optimum performance, quiet operation. Fully impregnated, progressive compounding, heavy encased housing, quick deliveries. Data on request.—Micramatic Limited, Bournemouth, Hants. 193

FLUORESCENT Berleon fittings and control units. Data on request.—H. Strong & Son Ltd., 20-21, Church Lane, London, N.W.10. 219

FLUORESCENT fittings and control gear for home and export. Wide range competitively priced. Catalogues from—Rada, Grimsby St., London, E.2 (Bishopsgate 1140/3495). 237

FLUORESCENT fittings, lamps, starters and control gear for home and export. Fully guaranteed by actual manufacturers. Send for catalogues. — The Anglo-American Electrical Company, Olive Street, Bury, Lancs. 245

FOR sale, D.C. motor or generator, 225/740 h.p., 135/460 r.p.m., 220/240 volts; also 410/1,350 h.p., 250/600 r.p.m., 400/440 v. As generator 625 kW, 325/480 r.p.m., 220/240 v. and 1,000 kW at 440 volts.—Fyfe, Wilson & Co. Ltd., Bishop's Stortford. 3810

FOR sale, large number of unused capacitors suitable for P.F. correction. All sizes up to 90 kVAr. Greatly reduced prices. Twelve months' guarantee.—Fyfe, Wilson & Co. Ltd., Bishop's Stortford. 3812

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GENERATING sets for power, lighting and welding, for sale, diesel, steam, petrol and gas, A.C. and D.C., from ½ to 500 kW.—Fyfe, Wilson & Co. Ltd., Bishop's Stortford. 3813

GENERATING sets, petrol and diesel-driven, up to 30 kVA, new and reconditioned. Plants built to special requirements; consult us without obligation.—Powerco Ltd., Wandsworth Town Stn., York Rd., London, S.W.18 (VANdyke 5234). 153

GENERATING sets, petrol engine-driven alternators, 220/240 volts, single-phase and 3-phase. — Britannia Manufacturing Co. Ltd., Britannia Walk, London, N.1. 19

GENERATING sets, petrol engine-driven dynamos, 110 volts and 220-440 volts, direct current. — Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, London, N.1. 18

GREENWOOD & Batley 150-kW, 3-phase, 50-period, 500-volt Turbo-Alternator with surface condenser, etc. Working steam pressure 200 lb./sq. in., 100° F. superheat. For further particulars apply to—Bairds & Scottish Steel Ltd., Gartsherrie Iron Works, Coatbridge. 3807

H.F. alternators, 1,500 cyc., 80 v., 25 amps. —E.W.S. Co., 69, Church Rd., Moseley, B'ham. 9941

HOBSON 5½" lathes from £120; Eagle surface grinders 15" × 6" at £140.—Victa Engineering Co., Maidenhead (Phone 50). 3809

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HOUSE service meters.—Electric Meter Co., Dept. ER46, Castle Circus Hse. Torquay. 9950

HUTS, Ladders, all types, from Podmore Works, Garratt Lane, London S.W.17 210

IMMEDIATE delivery new 330-kVA, 400-volt, 3-phase, 50-cycle, 4-wire B.T.H. alternator direct coupled to 400-h.p. Paxman diesel engine, 1,000 r.p.m., complete with switchboard and A.V.R. control.—C. J. Ferguson & Sons Ltd., 33, Barbican, London E.C.1 (Monarch 5474/5). 104

MERCURY switches are made by Hall, Brysdale & Co. Ltd., of 58, Commerce Road, Wood Green, London, N.22 (Tel. Bow 7221). 182

METERS, reconditioned, all types, AC/DC, quarterly credit, single and 3-ph. 3/4-wire, 2½/100 amp. Prepayment, single, dual and triple coin, fixed or variable tariff, 2½/50 amp. Delivery ex stock, guaranteed, free catalogue lists 200 types. Trade discount 33⅓%. — The Electric Meter Co., Dept. ER46, Castle Circus House, Torquay (Telephone 7963). 9947

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PLATING dynamos and motor generator sets, various sizes from 500 amps. up to 2,000 amps., with A.C. or D.C. motors.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 15

POLYPHASE kilowatt hour meters. Available from stock.—Universal Electrical, 221, City Road, London, E.C.1. 72

POLYPHASE 3/4-wire meters.—The Electric Meter Company, Dept. ER46, Castle Circus House, Torquay. 9951

POWER transformers, outdoor type, oil-immersed, self-cooled: Two Lindley-Thompson, 11 kV/433 volts, 3-ph., 50 cycles, 250 kVA; One Ferranti, 11 kV/433 volts, 3-ph., 50 cycles, 500 kVA. For details and price apply—Whitefield Machinery & Plant Limited, Cobden St., Salford, 6 (Tel. PEN. 1373/4). 3607

PREPAYMENT meters.—Electric Meter Co., Dept. ER46, Castle Circus Hse. Torquay. 9952

PREPAYMENT 1s. slot house service meters. —Universal Electrical, 217-221, City Road, London, E.C.1. 27

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TRANSFORMERS, new and secondhand, all voltages up to 10 kVA; also 50 kVA, 9,000/220/3/50, £95; 200 kVA, 400/200/3/50, £195.—Powerco Ltd., Wandsworth Town Station, York Rd., London, S.W.18 (VANdyke 5234). 152

TWO convertors, E.D.C., fully smoothed in silent cabinets: 100 v. D.C. to 230/1/50, 1.08 amps.; 100 v. D.C. to 230/1/65, .78 amps. —S. B. Swingler, 5, Bainbridge St., London, W.C.1 (MUS. 9851). 9974

VENNER time switches, 200-240 v. A.C./D.C., 10-50 amps., from stock.—Universal Electrical Co., 221, City Road, London, E.C.1. 29

WARD Leonard motor generator sets, all sizes.—Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, London, N.1 (Tel. Clerkenwell 5512). 10

WE can offer all types of textiles, grey cloths, industrial and protective clothing, cleaning rags, etc., also a quantity of 24-v. D.C. dynamos. Please send enquiries to—Surplus Textiles, 32a, Booth Street, Manchester, 2 (Cen. 2849 and 5547). 3608

WELDING dynamos and welding sets for sale.—Britannia Manufacturing Co. Ltd., 22-26, Britannia Walk, London, N.1. 11

WELDING 150-amp. generators, 1,500/2,000 r.p.m., 85/65 v., Mawdsley, unused, foot mounted, B.B., £65 ea.—Powerco, Wandsworth Town Station, York Road, London, S.W.18 (Vandyke 5234). 148

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1,500 cycle, single-phase, 80-volt, Newton 2-kW alternator and motor for radar work.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 3564

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MISCELLANEOUS

ARON ELECTRICITY METER LIMITED

NOTICE is hereby given that the Transfer Books and Register of Members of the Company will be closed from 8th to 17th July, 1954, both days inclusive.

By Order of the Board,
H. L. W. ALDRIDGE,
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COMPANY MEETING

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Mr. Fred T. Jackson on Broadening Basis of Operations

THE 25th Annual General Meeting of Telephone Rentals Limited was held on 21st June in London, Mr. Fred T. Jackson, O.B.E., Comp.I.E.E. (Chairman and Joint Managing Director) presiding.

The following is an extract from his circulated statement:—

Once more I am pleased to be able to report that we have had a successful year, as you will see from the accounts before you, which show a further increase in profits. I feel this is a very satisfactory result, especially as the year under review has been very difficult and one which has called for a great deal of anxious thought and hard work by all concerned.

You will remember that in the period 1951/52 we were in considerable difficulties over finance owing to the then prevailing restrictions on capital issues and credit. In due course these difficulties were overcome, but those of you who are industrialists will realise that when the planned progress of a company of our size with an extensive organisation is interrupted in this way, through no fault of its own, it is a very difficult matter after the organisation has been broken down to a certain extent to reconstitute and build up anew. I might liken this to the fly-wheel of a large engine which is able to put out a great deal of power before it is run down and stopped.

I would like to take this opportunity of paying tribute to the whole of our staff and employees who are members of our Profits Participation Scheme, who on this occasion put their shoulders to the wheel and worked all hours. This is something that is rarely found in any industrial concern in like circumstances, and to my mind is a wonderful tribute to what I might call a partnership between the workers and the shareholders, and is something which cannot be recognised in terms of money.

Widening Scope of Operations

Your Board of Directors always have in mind the broadening of the basis of your business which makes for stability as a profit-earning organisation. In this connection your Directors have not been unobservant of the trend of industry to transfer some of their manufacturing activities to the Dominions, either as assembly or actual manufacture. That being the case, there is bound to be a demand for the services which we supply in this country. As an example of this growth we could quote South Africa, Canada and Australia. As you know, a few years ago we opened up business in Johannesburg and in Cape Town. I am very glad to be able to tell you that this business is now very successful and is in a position to pay us for its requirements in equipment and also is earning satisfactory profits and will be able to pay a dividend for the past year.

Based on our experience in South Africa, during the past year we have opened an office in Toronto. We intend to limit our activities there around Toronto itself, and later on open up in other parts of Canada, as the distances in that country are so enormous it would not pay us to spread our activities over the whole country.

We have also acquired a half-interest in a business in Australia which has a quite substantial rental revenue. I might say that this was a business started by us before the last war, but at the outbreak of war we sold our interest to Australian industrialists. The acquisition of 50% of this business has been financed from our own resources.

The Directorate

During the year we have lost the services of one of our Directors by death, Mr. W. A. Jackson, who will be greatly missed at our regular Board meetings. In his place we are fortunate enough to obtain the services of Sir Leonard Browett, K.C.B., C.B.E., who I am quite sure will be of very great value to us because of his unique experience of taxation problems and finance generally.

Your Directors also have decided to exercise the powers they have under the Articles to appoint Executive Directors. We think that we should appoint two or three of our most promising managers, having in mind that possibly this will be a very good training ground for one or more of them to become Directors.

During the past year my colleague, Mr. Philcox, has visited Australia, Canada and, quite recently, South Africa. The work involved in dealing with our overseas interests is already considerable, and will become more so as each business develops. It is our intention to appoint one of our executives as Manager of our Overseas Companies Department and thus relieve administration at Head Office.

Proposed New Issue

At the moment your company is quite well off for liquid funds, but it will be necessary to raise further capital to finance our overseas commitments and to provide us with a reasonable working capital at home. We accordingly submitted an application to the Capital Issues Committee, and it gives me great pleasure to be able to report that we have received their consent. We therefore propose to issue 640,000 Ordinary Shares in the ratio of one to ten at present held at 7s. 6d. per share, which will realise £240,000 gross. The issue will be made direct to the shareholders for the proportionate number to which they are entitled, and an application form will be provided to enable shareholders to apply for extra shares should there be any not taken up.

Heavy Taxation Burden

You will have noticed from the group accounts before you that our liability for excess profits levy amounts to £85,750. This is a very heavy sum, and when it is added to income tax and profits tax you are bound to realise what a brake provision for such large sums for taxation is on the development of the business, and it seems to me that the heavy burden all industries in this country have to meet on account of taxation is such that in the long run it is bound to defeat its own ends, inasmuch as it prevents the earning of profits, which on a more reasonable basis of taxation would contribute very liberally to the revenue of the country.

Accounts

I will now refer to the accounts, which reflect one or two major changes as compared with the previous year.

PROFIT AND LOSS ACCOUNT. — The gross profit at £655,569 is another record and shows an increase of £38,683 over the previous year, but after deducting profits tax, excess profits levy and income tax totalling £458,779 the net profit is £196,790, which is £14,814 less than the net profit for 1952. This result will help you to appreciate the force of my remarks on the penal effect of the present level of taxation.

During the year we managed to secure repayment of the remainder of our war damage claims, as a result of which we received interest amounting to £8,643 which has been credited in the profit and loss account.

After providing for the transfer to general reserve of £100,000 and the dividends on both the Ordinary and Preference shares, amounting to £97,900, we are left with an unappropriated balance of £121,575 to be carried forward to the current year.

Balance Sheet

The issued capital has increased to £2,000,000 by virtue of the £280,000 bonus issue made in May of last year, and the share premium account has been reduced by £284,463 for the same reason. The only other movement in the capital reserves has been to increase the surplus on realisation of capital assets by the sum of £447, representing the profit on sales of company-owned houses.

The revenue reserves now stand at £800,000 after the transfer of £100,000 from the profit and loss account.

The shareholders' interests, consisting of capital, reserves and the unappropriated profit balance, amount to £2,969,380 as compared with £2,874,506 at the end of the previous year, and this sum is fully employed, as you can well see, in earning what I think may justly be termed a most satisfactory profit.

Current liabilities reflect the substantial increase of £364,079 over the previous year, which is mainly accounted for by the increase in our liability for taxation.

Turning now to the assets side of the balance sheet, the net value of the revenue-bearing installations is £2,529,885, which is equivalent to just over 1.5 years' rent.

The cost of freehold and leasehold properties at £102,936 shows an increase of £9,470, due to the purchase of premises for our Newcastle branch, and additional house property we have been obliged to buy, in order to enable us to transfer our managerial staff where they are most needed to further the profitability and efficiency of our business.

The amounts invested in our subsidiary companies, either by way of capital or advances, has increased by £76,450 to £501,316. This increase is mainly due to our Canadian venture which accounts for £52,531. The balance represents increases in advances to our two British subsidiaries to cater for their expansion, less a repayment of £25,000 received from South Africa.

Stock and work in progress shows the substantial reduction of £101,860, which enviable result has been achieved by our manufacturers reducing their delivery periods, thus enabling us to carry smaller minimum stocks.

We have increased our holding in Tax Reserve Certificates by £350,000 in an attempt to provide for our comparatively huge tax liabilities, and we have since been obliged to surrender £200,000 to meet our income tax liability on the 1st January last.

Cash in Australia has increased from £5,810 to £102,962 as a result of our remitting £100,000 at the end of 1953 as a first instalment towards the cost of purchasing our 50% interest in an Australian company, which I have already mentioned. We have remitted a further £90,000 in February of this year, and these two sums, together with the proceeds from the sale of our quoted investments in Australian issues will be sufficient to purchase our share of the initial capital.

Consolidated Balance Sheet and Profit and Loss Account

The consolidated accounts having been prepared on an identical basis to that of the parent company, the material changes have already been dealt with in the foregoing remarks.

The net profit of the Group before taxation is £702,430 compared with £667,068 for 1952. After providing for taxation, the transfers to reserves, and dividends, the balance of unappropriated profits carried forward and attributable to the holding company's shareholders amounts to £177,078.

Subsidiary Companies

All the subsidiaries of your company traded at a profit in 1953, with the exception of the two Canadian companies, which showed a combined loss of $24,926 (£8,934). This loss is incorporated in the figures shown in the consolidated accounts. The Canadian companies were only formed in September, 1953, and it is anticipated that we shall suffer further losses for the next year or two, until we are able to build up a reasonable rent roll, as this is an entirely new venture and unlike our other Dominion subsidiaries where we were able to take over going concerns with existing rental contracts.

Conclusion

In concluding my remarks, I would venture the opinion that although business has hardened considerably in this country and competition has increased, we anticipate being able to obtain our fair share of orders in this current year. For the first four months of this year we have obtained the target figure which we set ourselves.

As far as our two latest ventures in Canada and Australia are concerned it is too early to prophesy, as there is still a tremendous amount of spade work to be done and training to be accomplished. To produce the necessary momentum to ensure the smooth running of a machine takes time, but we have little doubt that in due course we shall make these two latest recruits to the Group as successful as the others.

The report and accounts were adopted and the final dividend of 6%, making 10% for the year, was approved. 3753

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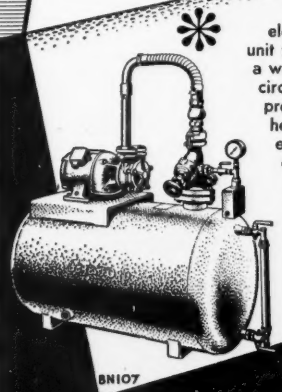

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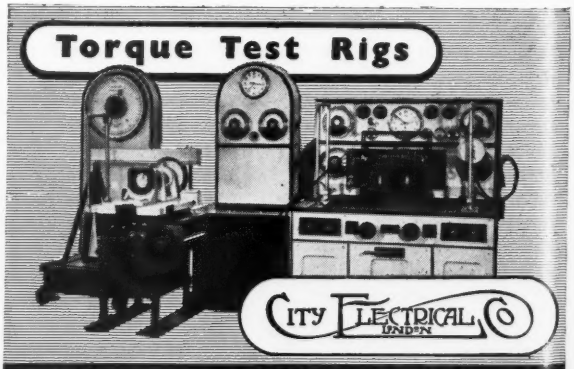

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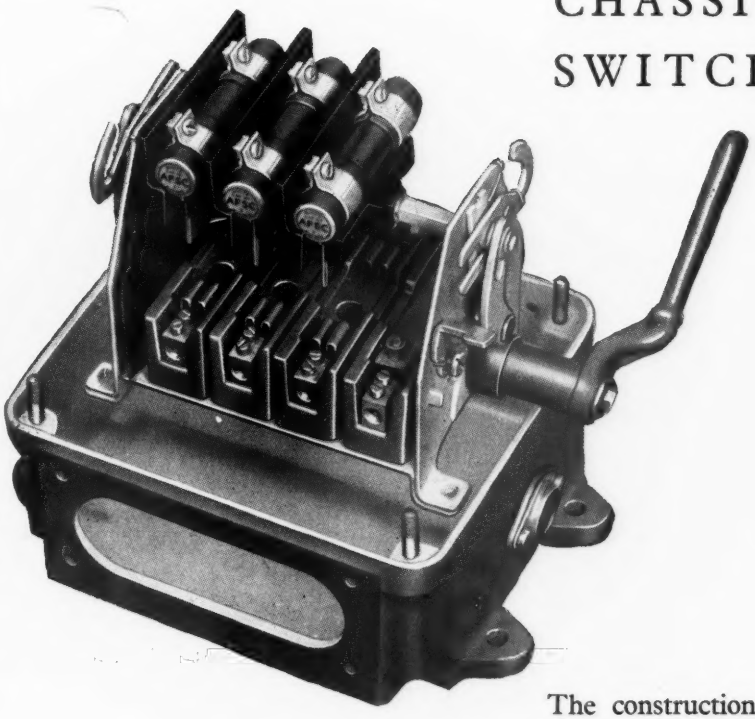

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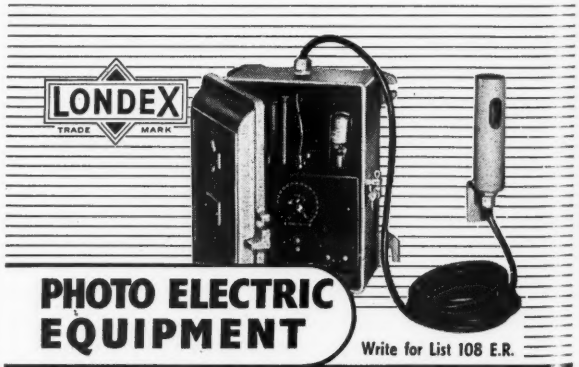

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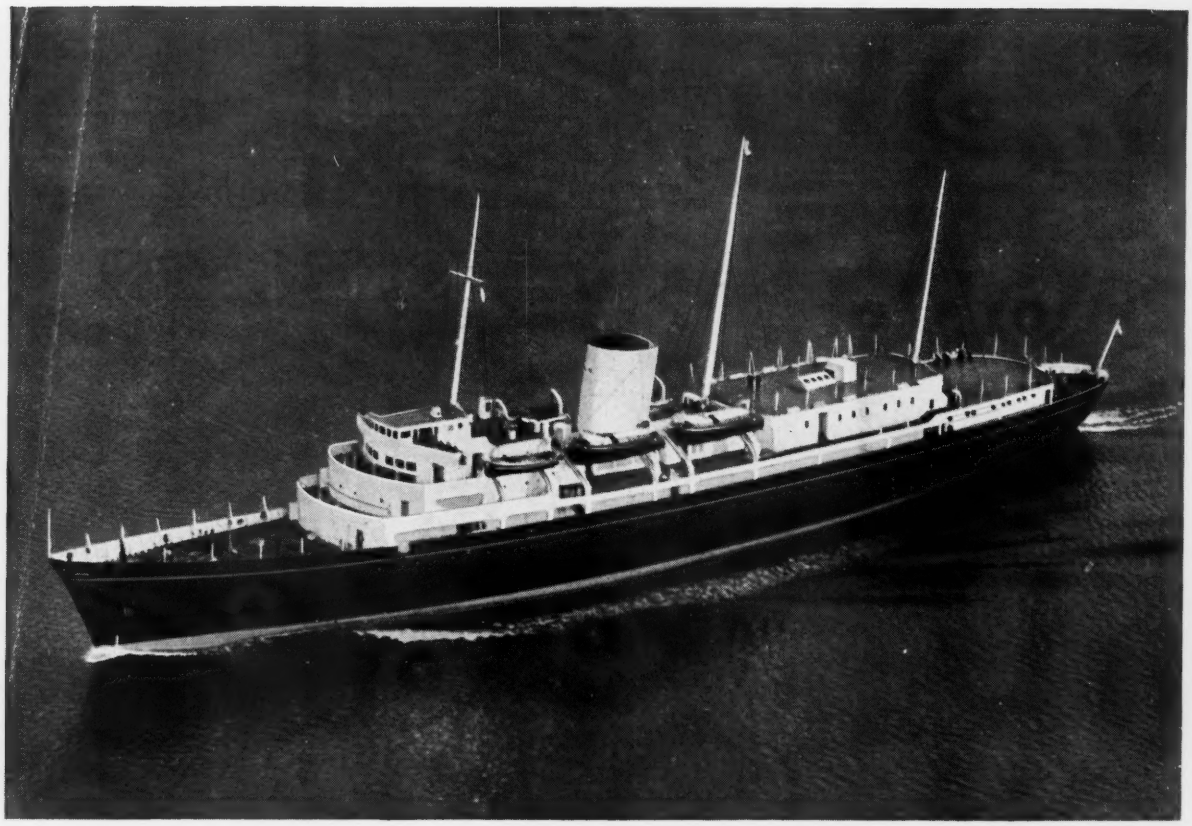

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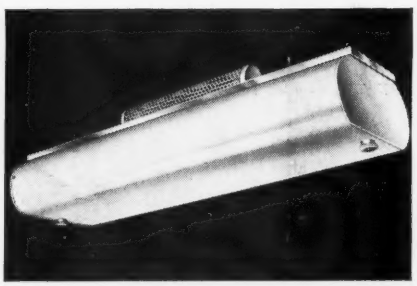

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